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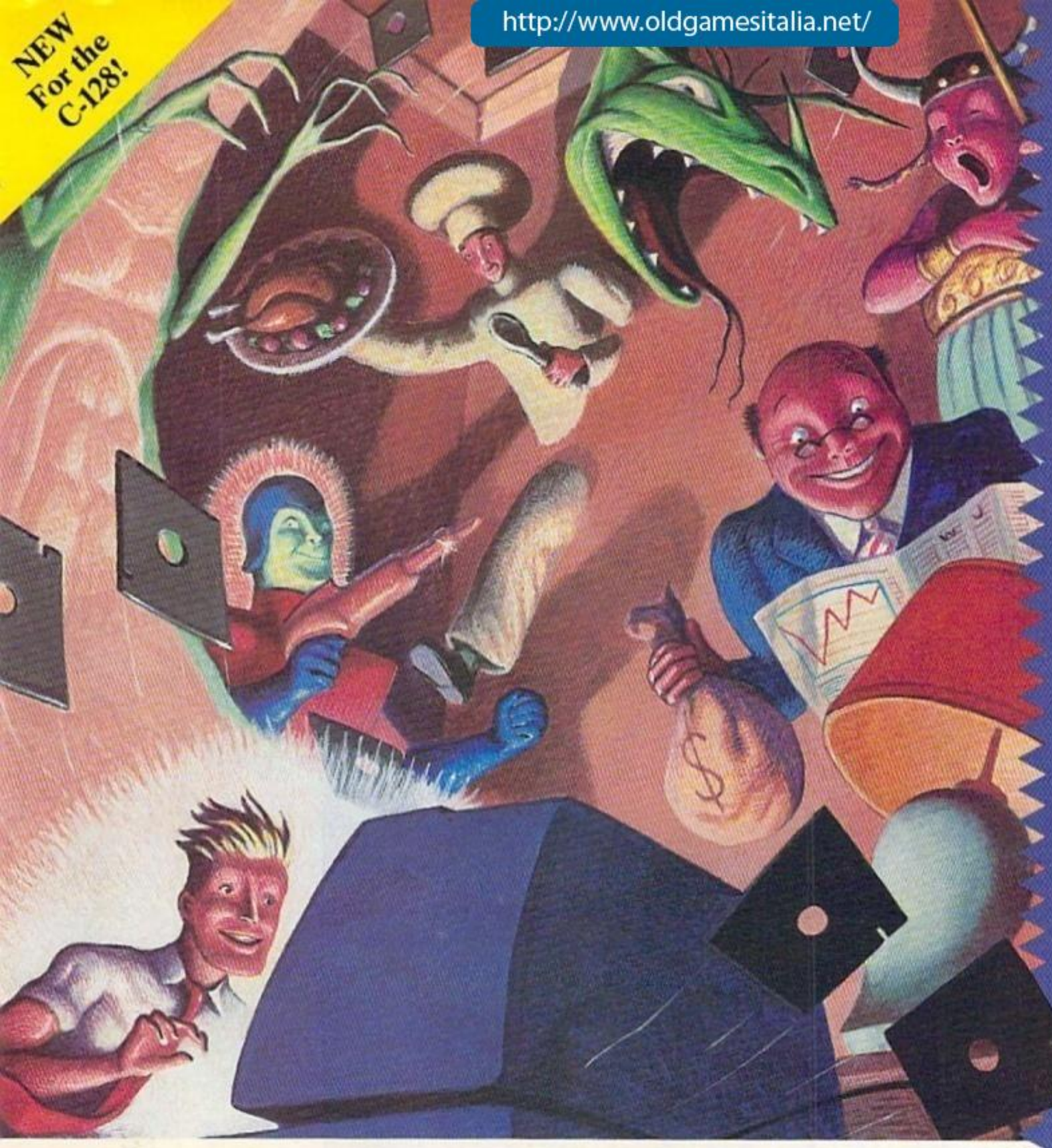

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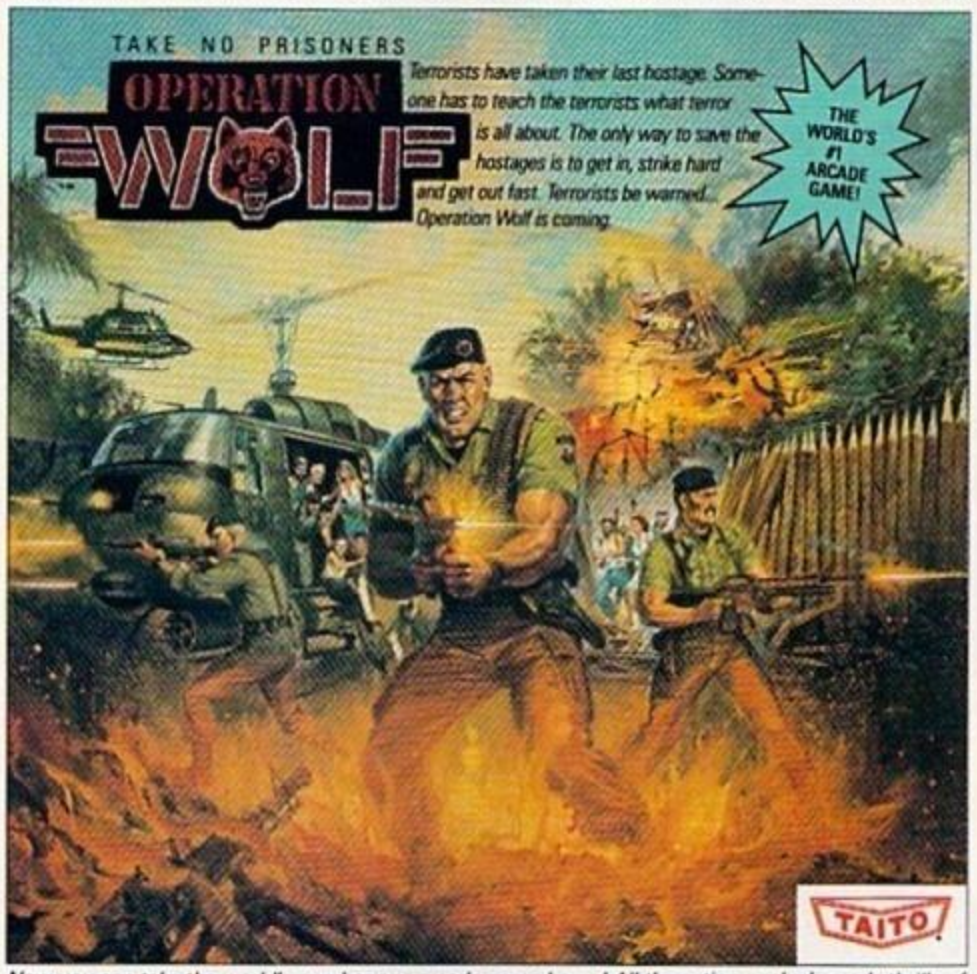
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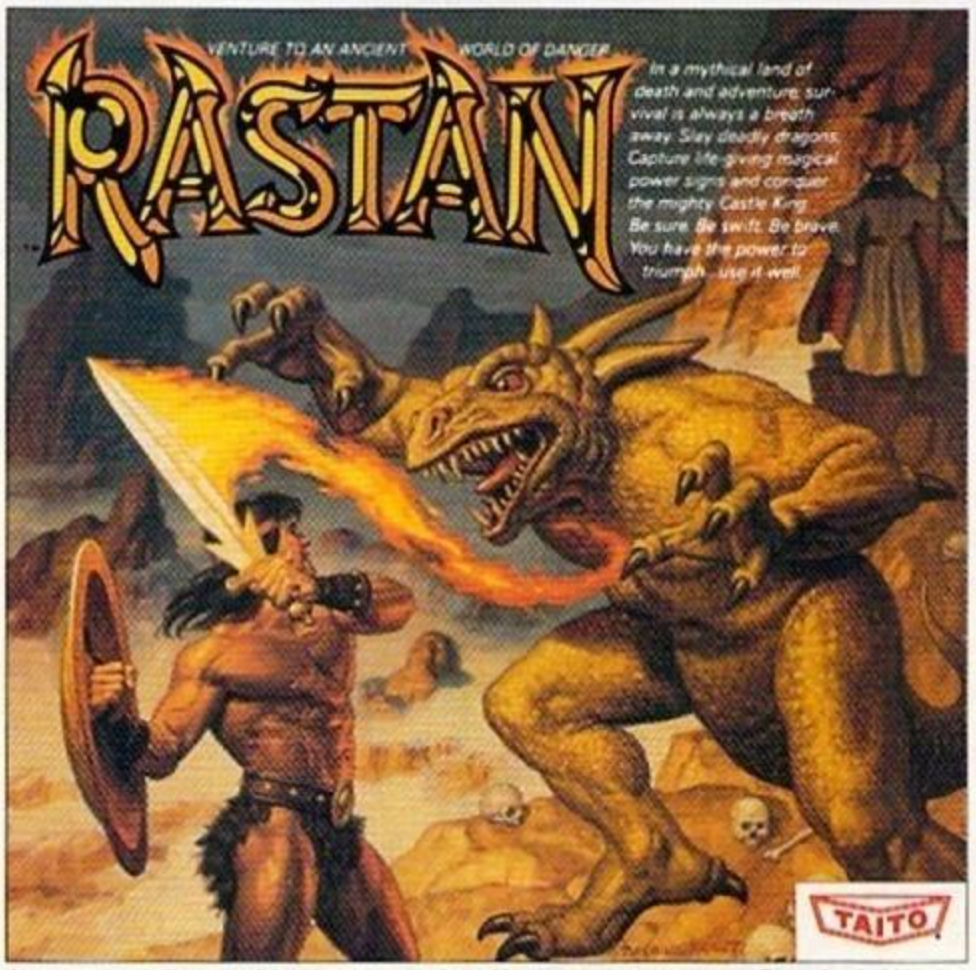
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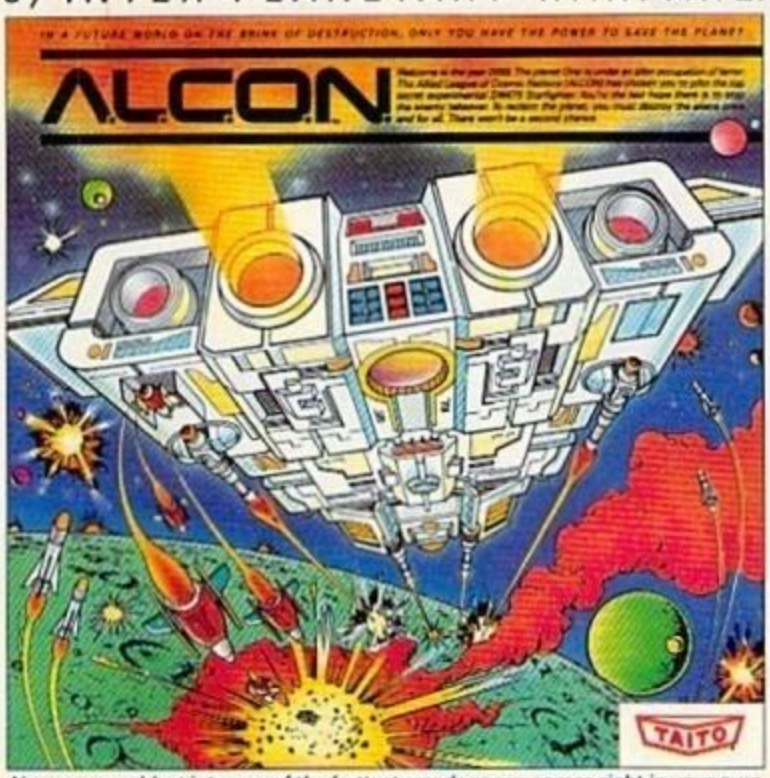

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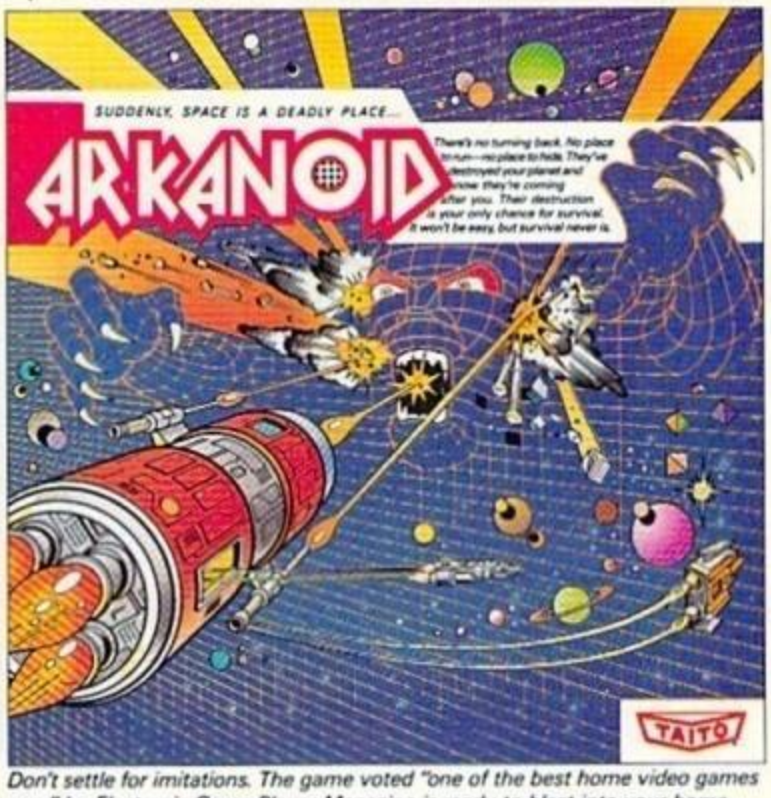
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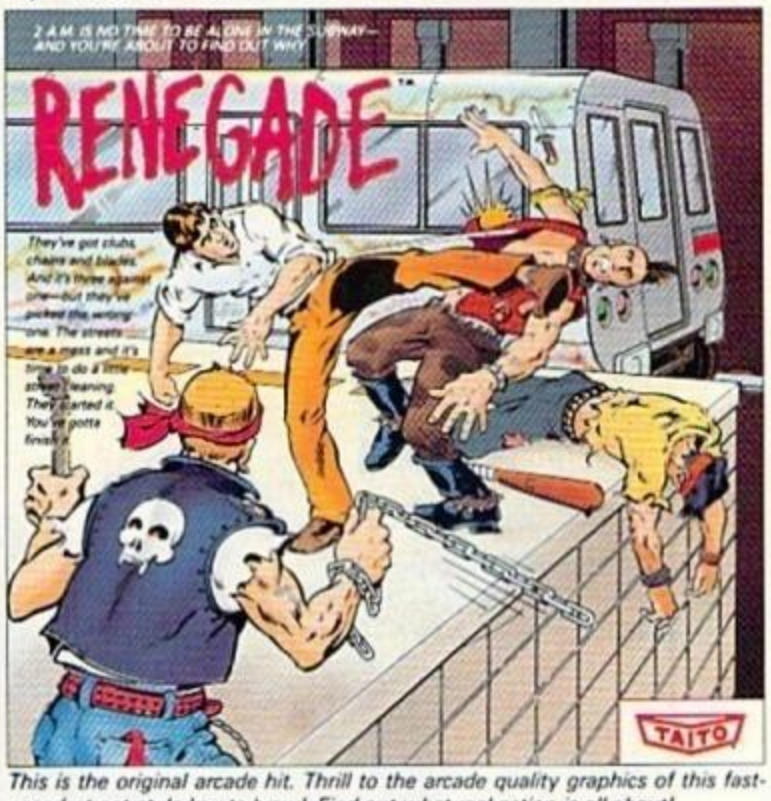
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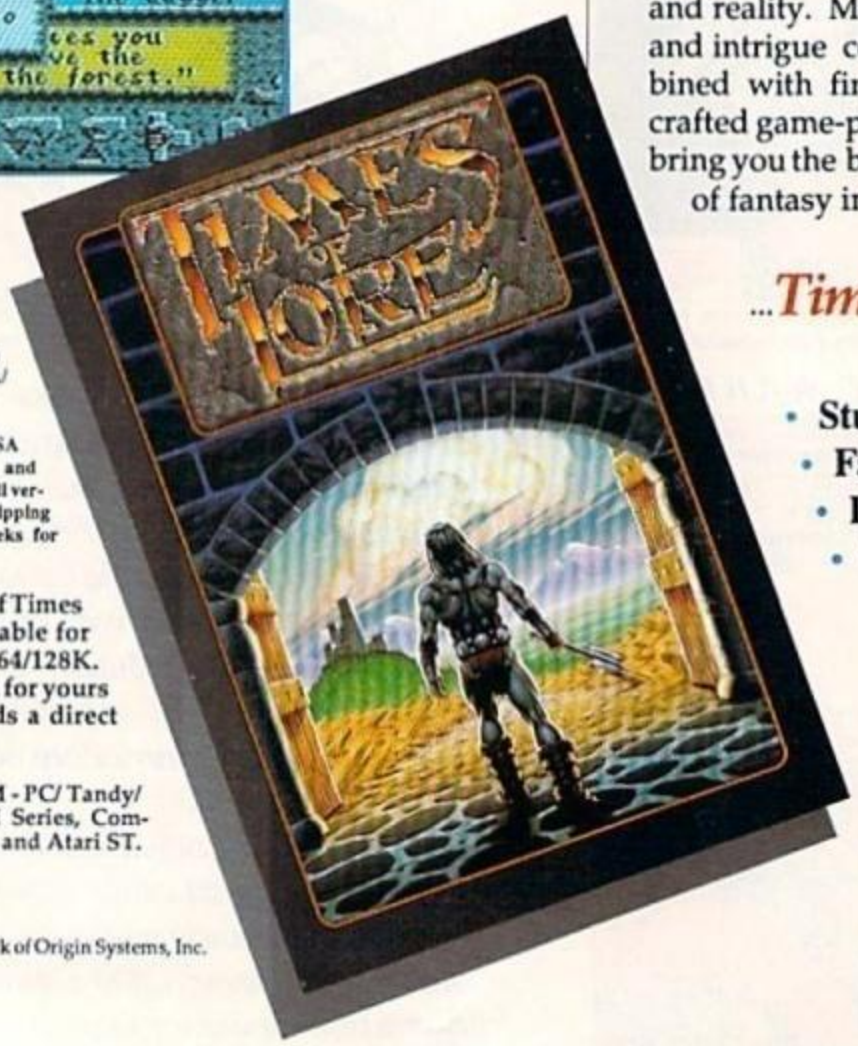

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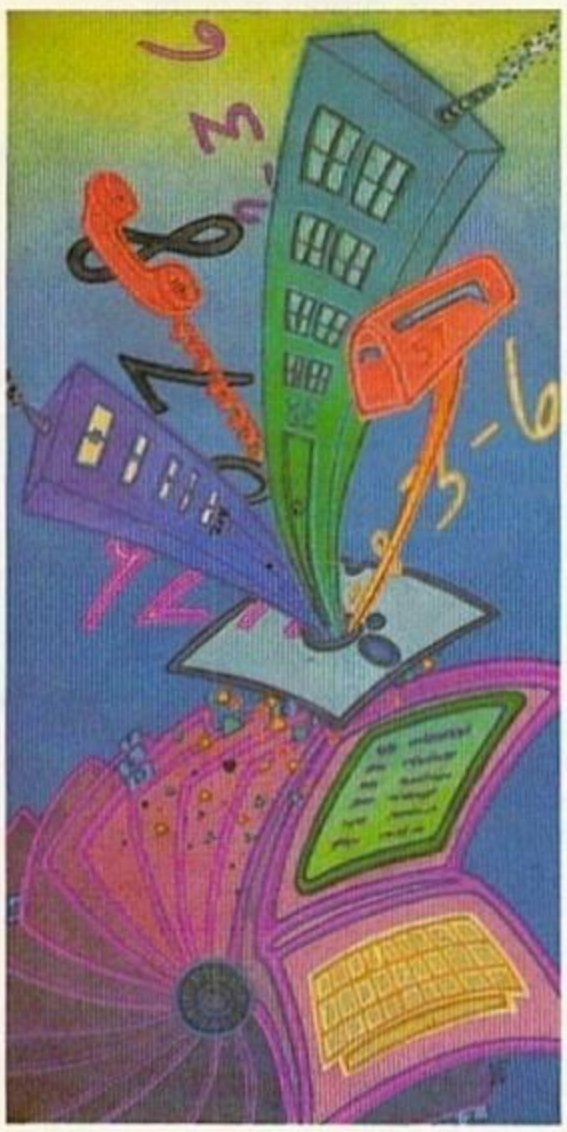

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COVER ILLUSTRATED BY BOB SCOTT

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RUNning Ruminations

Withdrawing from the Gold

Are you suffering from post-Olympic depression? Having difficulty adjusting to life without hour after hour of televised competition? Do you still yearn for the excitement, artistry and athletic prowess of worldwide contenders vying for Olympic gold?

Well, this issue, which contains the results of some intense rivalry, should soothe your competitive instincts. We have the results of not one, but two contests in the personal computing arena.

First, we list the winners of *RUN*'s Reader Choice Awards.

In a ballot published in the magazine this summer, *RUN* asked readers to vote for their favorite software in 19 different categories, ranging from utilities to arcade games.

Like an Olympic sculler without oars, a computerist needs software to make his computer perform. We wanted to find out what software *RUN* readers preferred. We were also curious as to the criteria readers used in making their software selections. We speculate that their selections depended on the software's features and ease of use, its recognition value, its performance and the reputation of the company. Or, simply, readers may have selected the software because it was the first (and only) one they tried.

Here are the results of two events of Olympic proportions. ◇

The results of our first-ever contest yielded a number of upsets. Some long-time performers that have been on the market for 4–5 years are, surprisingly, still represented in the winner's circle, along with more recent releases that maximize the sound and graphics capabilities of the Commodore.

The complete voting results begin on page 42. See how your favorites fared with other *RUN* readers.

Also on this month's sporting card are the results of Berkeley Softworks' desktop publishing contest. GEOS users were invited to submit their entries in any of seven different categories. The winning entries were selected by a distinguished panel of judges (composed of *RUN* editors). Beginning on page 58, we publish the seven winners, as well as some others that, although not selected for one of the top prizes, were high in creativity and imagination. It appears that desktop publishing applications are finding wide acceptance among Commodore 64 and 128 users.

As in the Olympics, it's not the winning that's the main thing, it's the participation. Thanks to all the contestants.

In keeping with the holiday season, we're presenting an arcade game that's sure to put you in the spirit of the season, and, for a look at the software coming onto the market that supports the Commodore peripherals—the mouse, the 3½-inch disk drive and the RAM expander—see the article on page 66.

For those of you who always wondered what makes your computer tick—but were hesitant about taking a peek yourself—we provide a close-up view of the chips and electronic circuitry and an explanation of how your computer operates. For an informative tour of the inside of your computer, turn to page 76. It's must reading for novices and experienced computerists alike.

Dennis Brisson

Dennis Brisson
Editor-in-Chief

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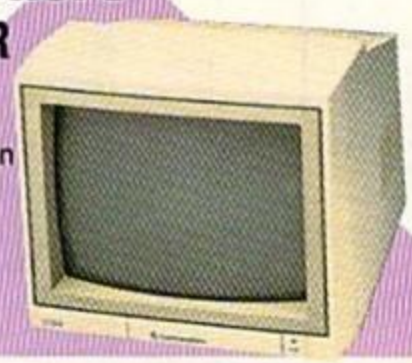

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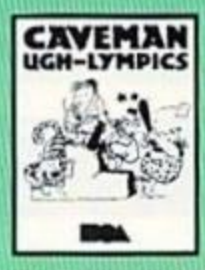

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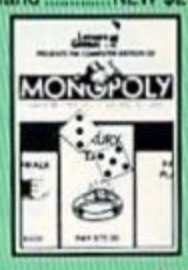

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MAGIC

Get in the spirit of the season with some holiday magic; learn Morse code; shake your screens.

Compiled by TIM WALSH

$4EA WINTER WONDERLAND

Get friends and family into holiday spirits with this upbeat version of Felix Bernard's "Winter Wonderland." It works in both 64 and 128 modes.

```
Ø REM WINTER WONDERLAND - JOE CHARNETSKI
                                        :REM*2Ø3
1Ø R=54272:FORI=RTOR+23:POKEI,Ø:NEXT:POKER
   +5,9:POKER+6,12:POKER+24,15     :REM*199
2Ø FORJ=1TO139:READD,Z:POKER+1,D:POKER+4,3
   3:IF(J=33)OR(J=1Ø6)THEN RESTORE:REM*2Ø7
3Ø FORT=1TOZ*117:NEXT:POKER+4,32:NEXT:POKE
   R+24,Ø                          :REM*178
4Ø DATA 5Ø,2,5Ø,1,5Ø,6,5Ø,2,5Ø,1,42,2,5Ø,6
   ,5Ø,2,5Ø,1,5Ø,6,5Ø,2,5Ø,1,44,2 :REM*155
5Ø DATA 5Ø,6,5Ø,2,63,2,63,1,63,2,56,6,56,2
   ,5Ø,2,5Ø,1,5Ø,2,44,6,42,2,42,1 :REM*226
6Ø DATA 42,2,42,1,37,2,37,1,37,2,37,1,33,6
   ,33,2,33,1,56,2,56,1,37,2,37,1  :REM*89
7Ø DATA 59,2,59,1,56,2,44,6,33,2,33,1,56,2
   ,56,1,37,2,37,1,59,2,59,1,56,6  :REM*73
8Ø DATA 44,2,44,1,75,2,75,1,5Ø,2,5Ø,1,79,2
   ,79,1,75,2,59,6,59,2,67,1,75,2  :REM*37 ►
```

TRICK OF THE MONTH

$4EB MORSE CODE MANIA

Anyone familiar with Morse code can tell you it can be learned quickly through repetition. My 128- and 64-mode program, Morse Code Trainer, repeatedly sounds the dots and dashes of randomly chosen letters to ensure the gradual mastery of the code.

When you run the program, you're prompted to enter a delay length to define how quickly a letter is sounded. You have ten seconds to respond, but you can adjust the response time with the variable T$.

Once a letter is sounded, press the corresponding letter key. If you want the code repeated, press the minus sign key. Press + to see your score and * to quit the program.

```
Ø REM MORSE CODE TRAINER - KEN SLIGHT
                                        :REM*18
1Ø POKE 53281,Ø:POKE5328Ø,Ø:PRINT"{SHFT CL
   R}{CTRL 2}"CHR$(14)CHR$(8)       :REM*1Ø
2Ø T$="ØØØØ1Ø"                      :REM*48
3Ø INPUT"DELAY LENGTH";D:IF D<Ø THEN 3Ø
                                    :REM*193
4Ø PRINTTAB(1Ø)"{SHFT CLR}{CTRL 9}MORSE CO
   DE TRAINER{CRSR DN}":A(1)=2Ø:A(2)=2ØØ:S
   =54272                           :REM*65
5Ø DIM CODE(25,3)                   :REM*218
6Ø FORT=Ø TO 25:FORI=Ø TO 3:READCODE (T,I)
   :NEXT:NEXT                       :REM*15
7Ø FORK=S TO S+24:POKEK,Ø:NEXT:PRINT:W%=RN
   D(1)*26                          :REM*78
8Ø TI$="ØØØØØØ":FORI=Ø TO 3:C=CODE(W%,I)
                                    :REM*3
9Ø POKES+5,9:POKES+6,Ø:POKES+24,15:POKES+1
   ,25:POKES,157:POKES+4,32         :REM*161
1ØØ IF C<>Ø THEN POKES +4,33:FORT=Ø TO A(C
   ):NEXT                           :REM*126
11Ø POKES +4,32:FORT=ØTOD:NEXT:NEXT:PRINT:
   PRINT"ENTER LETTER:"             :REM*1Ø9
12Ø PRINT"- TO REPEAT, + TO SEE RATING, *
   TO QUIT"                         :REM*122
13Ø GETA$:IFTI$<T$ AND A$<>"-" ANDA$<>"+"
   ANDA$<>"*"ANDA$="" THEN 13Ø      :REM*68
14Ø IF A$=CHR$(65+W%) THEN 2ØØ      :REM*134
15Ø IF A$="-" THEN 8Ø               :REM*157
16Ø IF A$="+"AND P>Ø THEN GOSUB 22Ø:GOTO8Ø
                                    :REM*141
17Ø IF A$="*"AND P>Ø THEN GOSUB 22Ø:END
                                    :REM*127
18Ø IF TI$>T$ OR A$<>CHR$(65 +W%) THEN 21Ø
                                    :REM*136
19Ø GOTO 13Ø                         :REM*1
2ØØ PRINT"{CRSR DN}"CHR$(W% +65)", YOU GOT
    IT, TIME= "TI$:R=R+1:P=P+1:GOTO 7Ø
                                    :REM*165
21Ø PRINT"{CRSR DN}INCORRECT ANSWER, LETTE
   R IS "CHR$(65+W%):P=P+1:GOTO 7Ø
                                    :REM*221
22Ø PRINT"{CTRL 2}TRIED="P" RIGHT="R"{2 SP
   ACEs}%="R/P*1ØØ:RETURN           :REM*93
23Ø DATA Ø,Ø,1,2,2,1,1,1,2,1,2,1,Ø,2,1,1,Ø
   ,Ø,Ø,1,1,1,2,1,Ø,2,2,1,1,1,1,1:REM*246
24Ø DATA Ø,Ø,1,1,1,2,2,2,Ø,2,1,2,1,2,1,1,Ø
   ,Ø,2,2,Ø,Ø,2,1,Ø,2,2,2,1,2,2,1:REM*247
25Ø DATA 2,2,1,2,Ø,1,2,1,Ø,1,1,1,Ø,Ø,Ø,2,Ø
   ,1,1,2,1,1,1,2,Ø,1,2,2,2,1,1,2 :REM*85
26Ø DATA 2,1,2,2,2,2,1,1            :REM*83
```

—KEN SLIGHT, JEFFERSON, WI

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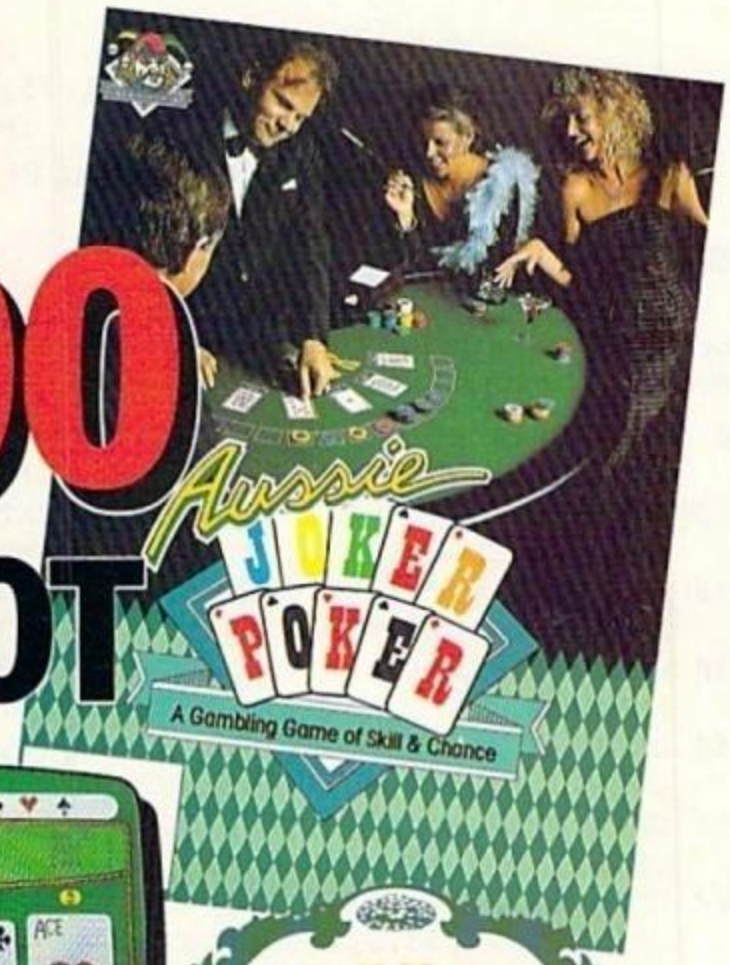
Aussie JOKER POKER

$200,000 JACKPOT



The latest multi-player multi-format PC game from Australia is different to all forms of Poker.

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Prize includes air travel for Finalists and their guests from the major airport to Las Vegas with two days and two nights accommodation at the Golden Nugget (approx. retail value $750 each subject to departure points).	$15,000

All taxes and other expenses not specified herein are sole responsibility of winners. All winners will be notified in writing.

Aussie JOKER POKER is available for SIX major PC's

If your PC has a mouse or keyboard, a mono or color monitor and a 512K minimum ram (except Apple II and C64/128 use 64K and keyboard only) you and your family can practise at home for the Las Vegas final of the **Aussie JOKER POKER contest.**

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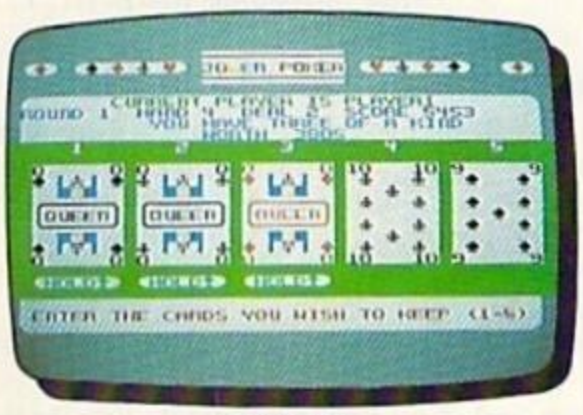

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```
9Ø DATA 75,1,75,2,75,1,67,2,67,1,75,2,67,1
   ,59,6                                  :REM*163
```

—JOSEPH CHARNETSKI, PLAINS, PA

$4EC SILVER BELLS

"Silver Bells" is a much-enjoyed Christmas song written by Jay Livingston and Ray Evans. Here's a computer version that sounds great on both the C-64 and C-128.

```
Ø REM SILVER BELLS - JOE CHARNETSKI
                                          :REM*181
1Ø S=54272:FORR=STOS+23:POKER,Ø:NEXT:POKES
   +5,9:POKES+6,1Ø:POKER,15               :REM*158
2Ø FORI=1TO148:READA,B:POKES+1,A+42:POKES+
   4,21:IFI=74THEN RESTORE                :REM*199
3Ø FORJ=1TO132*(B+2):NEXT:POKES+4,2Ø:NEXT:
   POKER,Ø                                :REM*87
4Ø DATA 25,,14,,8,,,3,25,,14,,8,,,4,42,,33
   ,,25,3,14,,14,2,14,6,33,,25,           :REM*211
5Ø DATA 21,2,8,,5,,2,,8,2,2,,2,,,6,25,,14,
   ,8,,,3,25,,14,,8,,,4,42,,33,           :REM*41
6Ø DATA 25,2,14,,14,2,14,6,33,,25,,21,2,8,
   ,5,,2,,8,2,33,2,25,7,,,2,,8,4          :REM*2Ø9
7Ø DATA 14,,21,,25,5,21,,21,,25,,33,1,25,,
   21,,25,,8,5,,,2,,8,4,14,,21,           :REM*123
8Ø DATA 25,5,21,,21,,25,,33,1,25,,21,,25,7
                                          :REM*23Ø
```

—JOSEPH CHARNETSKI, PLAINS, PA

$4ED YULETIDE MAGIC

Light up your home this holiday season with an interesting departure from computerized holiday songs. Yuletide Magic converts your C-64 or C-128 (40-Column mode only) screen to a dazzling, animated greeting card. Use it as a window display along with the traditional window candles.

```
Ø REM YULETIDE MAGIC - JOE CHARNETSKI
                                          :REM*8Ø
1Ø POKE5328Ø,Ø:POKE53281,Ø:PRINT"{SHFT CLR
   }{COMD 3}"                             :REM*36
2Ø DIMM(133):R=54272:X=1163:M(1)=X:I=1
                                          :REM*137
3Ø FORL=1TO17:J=J+2:X=X+39:IF(L=5)OR(L=12)
   THENJ=J-4:X=X+2                        :REM*88
4Ø FORT=ØTOJSTEP2:I=I+1:M(I)=T+X:NEXT:NEXT
                                          :REM*45
5Ø FORC=1 TO 33:S$=S$+" ":NEXT:FORC=1TO23:
   PRINTTAB(3)"{CTRL 9}"S$:NEXT           :REM*176
6Ø FORC=1TO21:PRINTTAB(4)"{2 CRSR UPs}{COM
   D H}"MID$(S$,5)"{COMD N}":NEXT         :REM*254
7Ø PRINTTAB(5)"{CTRL 8}MERRY{2 CRSR DNs}{5
    CRSR LFs}CHRISTMAS"                   :REM*187
8Ø FORJ=1TOI:POKER+M(J),13:POKEM(J),81:NEX
   T                                      :REM*2Ø1
9Ø FORJ=1TO2:B=X+13+J*4Ø:POKER+B,9:POKEB,1
   6Ø:NEXT                                :REM*65
1ØØ K=RND(.)*7+1:FORT=1TO24:J=RND(.)*I+1:P
    OKER+M(J),K:POKEM(J),86               :REM*2Ø2
11Ø POKEM(J),81:NEXT:GETA$:ON-(A$="")GOTO1
    ØØ:PRINT"{SHFT CLR}"                  :REM*229
```

—JOSEPH CHARNETSKI, PLAINS, PA

$4EE WORLD'S GREATEST SEQ FILE MERGE

Here's a great Magic trick sure to be appreciated by all who use sequential files—it's the finest sequential file-merging trick ever accidentally discovered. There's no need for you to insert awkward Concat commands or anything else. Just enter the Basic 2.0 Copy command in either 64 or 128 Direct mode:

```
OPEN 15,8,15,"C0:MERGED FILE = FILENAME1,FILENAME2,
  FILENAME3":CLOSE15
```

In the above example, "merged file" is the sequential file produced by merging together "filename1,filename2,filename3". Disk space is virtually the only limitation to the number of files that can be merged into one, and user files can even be mixed in with sequential files without any problems. Numerous opportunities are suddenly made possible by using this command. Now word processor users can easily merge documents without even booting up the word processor!

—MELVIN COLUMNA, NEWARK, NJ

$4EF C-64/C-128 TEXT-FILE READER

A couple of years ago, a pal and I engaged in a friendly contest to see who could write the shortest sequential text-file reader. We can't remember just who won, but I would like to present an enhanced version of the results.

This program, Micro Reader, employs the rarely used M command to read either sequential or program text files. It can direct output to either a printer or the screen. It may be run on either the C-64 or C-128. With the C-64, press any key to pause and resume; with the C-128, use the no-scroll key to pause.

A lot of features are compressed into the four lines that occupy less than a block of disk space. You'll find it handy for use as a subroutine for other programs.

```
Ø REM MICRO READER 64/128 - JIM SANDERS
                                          :REM*178
1Ø INPUT"{SHFT CLR}{CTRL 2}{CRSR DN}FILENA
   ME";F$:INPUT"PRINT Y/N";R$:D=3:IFR$="Y"
   THEND=4:S=7                            :REM*64
2Ø OPEN1,8,2,F$+",M,R":OPEN4,D,S:PRINT"{SH
   FT CLR}":PRINTCHR$(14)                 :REM*137
3Ø GET#1,A$:IFST=ØTHENPRINT#4,A$;:WAIT198,
   1,1:POKE198,Ø:GOTO3Ø                   :REM*182
4Ø PRINT#4:CLOSE1:CLOSE4:INPUT"{CRSR DN}AN
   OTHER Y/N";Q$:IFQ$="Y"THEN1Ø           :REM*8
```

—JIM SANDERS, KNOXVILLE, TN

$4FO FANCY PROGRAM NAMES AND TITLES

Personalizing your Basic programs without a line number preceding your name or program title requires a small touch of magic. Here's a six-step guide to accomplish the process after loading in your program:

1. Enter line 0 as: 0 REM"
2. Press return
3. Move the cursor back up to the space at the right of the quotation mark
4. Hold down shift and press the insert-delete key six times
5. Release the shift key and press insert-delete six more times
6. Type in your name or program title and press return

—BILL KENDRICK, COLFAX, CA

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$4F1 Check Disk Format

After upgrading from a C-64 and 1541 to a C-128 and 1571, I permanently changed the device number of my 1541 to 9 to use along with the C-128. Since I'm swapping disks between the 1571 and 1541, it is vitally important that I know the format (double- or single-sided) of the disks I use.

I wrote Check Disk Format, a 64- and 128-compatible program that quickly checks the format of a disk in either drive. It'll print to the screen the disk name, I.D. number and the format of the disk. You can use it as a handy subroutine in any program that offers disk access.

```
Ø REM CHECK DISK FORMAT - GEORGE VOTRUBA
                                        :REM*93
1Ø S$="{CRSR UP}":FOR I=1 TO 39:S$=S$+" ":
   NEXT:S$=S$+CHR$(13)+"{CRSR UP}":PRINT"{
   SHFT CLR}"                           :REM*38
2Ø PRINT"{CRSR DN}INSERT DISK AND ENTER DE
   VICE NUMBER."                        :REM*217
3Ø INPUT"(8 OR 9 OR Q TO QUIT) ? 8 {4 CRSR
    LFs}";UN$:IF LEFT$(UN$,1)="Q" THEN END
                                        :REM*49
4Ø UN=VAL(UN$):IF UN<>8 AND UN<>9 THEN PRI
   NT"{2 CRSR UPs}":GOTO 3Ø             :REM*64
5Ø PRINT S$;S$;"UNIT NUMBER:","{CTRL 9}"UN
   :DI$="":ID$=""                       :REM*179
6Ø OPEN 15,UNIT,15:OPEN 5,UNIT,5,"#"
                                        :REM*244
7Ø PRINT#15,"U1:"5;Ø;18;Ø               :REM*96
8Ø FOR I=ØTO3:GET#5,FL$:NEXT:IF FL$=""THEN
    FL$=CHR$(Ø)                         :REM*245
9Ø FOR I=4 TO 143:GET#5,A$:NEXT          :REM*6
1ØØ FOR I=144 TO 161:GET#5,A$:IF A$="" THE
    N A$=CHR$(Ø)                        :REM*199
11Ø :IF ASC(A$)<>16Ø THEN DI$=DI$+A$
                                        :REM*2Ø8
12Ø NEXT I:PRINT "DISK NAME:{CTRL 9}",DI$
                                        :REM*54
13Ø FOR I=162 TO 163:GET#5,A$:ID$=ID$+A$:N
    EXT:PRINT"DISK I.D.:",ID$           :REM*22Ø
14Ø PRINT "FORMAT:",,                   :REM*138
15Ø IF ASC(FL$)=128 THEN PRINT "DOUBLE-SID
    ED":GOTO 17Ø                        :REM*22Ø
16Ø PRINT"SINGLE-SIDED"                 :REM*124
17Ø CLOSE5:CLOSE15:GOTO 2Ø              :REM*133
```

—George F. Votruba, Missoula, MT

$4F2 Earthquake Simulator

Add some pizzaz to your latest C-64 game with Screen Shaker 64. This subroutine vigorously "shakes" the screen as many times as indicated by the value of Z, which has a default value of 20. Your small adventure programs can now come alive with excitement.

```
Ø REM SCREEN SHAKER - JOSEPH R. CHARNETSKI
                                        :REM*61
1Ø PRINTCHR$(147):FOR D= 1 TO 136        :REM*7
2Ø PRINT"DEMO ";:NEXT:Z=2Ø:GOSUB4Ø:END
                                        :REM*81
3Ø :                                    :REM*88
4Ø FOR I=Ø TO 15 STEP 3:POKE 5327Ø,I:NEXT
                                        :REM*Ø
```

►

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```
5Ø J=J+1+(J=Z)*(Z+1):IF J>Ø THEN 4Ø:REM*25
6Ø POKE 5327Ø,2ØØ:RETURN              :REM*95
```

—JOSEPH CHARNETSKI, PLAINS, PA

$4F3 WHERE, OH WHERE CAN THAT LITTLE MOUSE BE?

Bought a 1351 mouse recently? Can't find enough room on your desk for smooth operation? No problem, just toss the magazines, disks, coasters and any other assorted clutter off the top of your disk drive and you'll have a great mouse pad.

—AARON PEROMSIK, WORCESTER, MA

$4F4 MOVING THOSE BYTES

Byte Mover 64 is an unusual, but useful program that any programmer can use. Type in Byte Mover 64 using *RUN*'s Checksum and save it to disk or tape. When run, the program installs a machine language routine that moves large blocks of memory at lightning-fast speed. It moves almost 9000 bytes into screen memory in about half a second. How's that for speed?

Once you've activated the program, use the following syntax to move blocks of memory:

SYS 832,FA,TA,NB – 1

FA represents "from address," which is the address the data currently resides; TA is "to address," which is the address the data is to be moved to; and NB – 1 is the number of bytes to be moved minus one. For example, to move *RUN*'s Checksum to a new address, run it, then run Byte Mover 64 and enter the following:

SYS 832,49152,32768,169

RUN's Checksum can then be turned on and off with SYS 32768.

```
Ø REM BYTE MOVER - MICHAEL MYERS    :REM*82
1Ø SA=832:FOR I=SA TO SA+76:READQ:POKE I,Q
   :CK=CK+Q:NEXT                    :REM*231
2Ø IF CK<> 11Ø81 THENPRINT"ERROR IN DATA S
   TATEMENTS":END                   :REM*237
3Ø DATA 162,Ø,134,251,32,253,174,32,158,17
   3,32,247,183,166,251,165,2Ø,149:REM*184
4Ø DATA 169,165,21,149,17Ø,232,232,224,6,2
   Ø8,229,16Ø,Ø,177,169,145,171,56:REM*229
5Ø DATA 165,173,233,1,133,173,176,8,198,17
   4,165,174,2Ø1,255,24Ø,24,24,165:REM*196
6Ø DATA 169,1Ø5,1,133,169,144,3,23Ø,17Ø,24
   ,165,171,1Ø5,1,133,171,144,213   :REM*83
7Ø DATA 23Ø,172,176,2Ø9,96          :REM*26
8Ø T=TI:FOR I=4Ø96Ø TO 49152 STEP 999:SYS
   SA,I,1Ø24,999:NEXT:T=(TI-T)/6Ø   :REM*26
9Ø PRINTCHR$(147);CHR$(17);"DONE: 8991 BYT
   ES MOVED IN "T" SECONDS"         :REM*22
```

—MICHAEL MYERS, BEARDSTOWN, IL

$4F5 PRINTER GRAPHICS EDITOR 64/128

Designing printer graphics characters with pencil and paper is tedious and time-consuming. Printer Graphics Editor 64/128 eliminates the drudgery and long hours designing printer graphics characters by making the computer perform the code conversions.

This program works with Commodore MPS-803/1525-compatible printers and dot matrix printers using printer interfaces that offer Commodore printer emulation. The default custom graphics character is a wine glass, which can be changed to anything else desired. Simply design your custom printer graphic by entering asterisks in the grid provided in lines 10 through 70 of the program and pressing return after entering each line.

When run, the program displays the six CHR$ codes that make up the character and a line of code needed to print it out. To print your character, move the cursor up to the line beginning with an Open statement and press return. To use the character in your own program, use a CHR$(8) followed by the six CHR$ values that appear when you run the program. Refer to your printer and interface manuals for more information on printer graphics characters.

```
Ø REM C-64 PRINTER GRAPHICS EDITOR - RICHA
  RD PENN                           :REM*1Ø9
1Ø DATA"******"                     :REM*1Ø6
2Ø DATA"*{4 SPACEs}*"                :REM*157
3Ø DATA" *{2 SPACEs}* "              :REM*163
4Ø DATA"{2 SPACEs}**{2 SPACEs}"      :REM*169
5Ø DATA"{2 SPACEs}**{2 SPACEs}"      :REM*191
6Ø DATA"{2 SPACEs}**{2 SPACEs}"      :REM*197
7Ø DATA"******"                      :REM*174
8Ø DIM C$(7,8):FORX=1 TO 7:READ A$:FORY=1T
   O6:C$(X,Y)=MID$(A$,Y,1):NEXT:NEXT
                                     :REM*1Ø3
9Ø FORX=1 TO 6:FORY=1 TO 7:IF C$(Y,X)="*"T
   HEN Q=Q+2{UP ARROW}(Y-1)          :REM*126
1ØØ NEXT:Q=Q+128:PRINTQ" ";:C$=C$+CHR$(Q):
   Q=Ø:NEXT                          :REM*26
11Ø PRINT:PRINT:PRINT"OPEN1,4:PRINT#1,CHR$
   (8)C$CHR$(15):PRINT#1:CLOSE1{2 CRSR UP
   s}"                               :REM*152
```

—RICHARD PENN, MONTREAL, QUEBEC, CANADA

$4F6 64 FULL-SCREEN EDITOR

Over the years, the Magic column has published programs that perform specific screen-editing functions on the C-64. A good example is "Clr-Bottom Key" (Magic $47E, March 1988) that lets the F1 and F3 keys clear the screen and place the cursor at the bottom of the screen.

My 64 Full-Screen Editor expands on that by offering a screen-editing feature for function keys F1, F3, F5 and F7. F1 erases the line the cursor is on and moves the cursor up one line. F3 also erases the cursor's current line, but moves the cursor down one line. F5 clears the current cursor line, plus all lines below, in effect operating as a partial screen clear. Finally, F7 moves the cursor to the 24th screen line.

Combined with the clr-home and shift/clr-home keys, 64 Full-Screen Editor gives you complete screen-editing capabilities. For example, an entire 80-character program line can be erased by pressing F3, followed by F1. Pressing F7 followed by F5 clears the bottom of the screen for entering Direct mode commands. There's no limit to the number of uses you'll find with 64 Full-Screen Editor.

```
Ø REM 64 SCREEN EDIT - LEONARD LENIEWSKI
                                     :REM*243
```


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MAGIC

```
10 FORC=53100 TO 53214:READ D:POKE C,D:NEX
   T                                    :REM*7
20 PRINTCHR$(147)"F1 CLEARS CRSR LINE, MOV
   ES UP 1 LINE."                       :REM*223
30 PRINT"F3 CLEARS CRSR LINE, MOVES DOWN 1
    LINE."                              :REM*96
40 PRINT"F5 CLEARS CRSR LINE TO SCREEN BOT
   TOM."                                :REM*144
50 PRINT"F7 MOVES CRSR LINE TO 24TH SCREEN
    LINE."                              :REM*164
60 PRINT"SYS 53100 ACTIVATES PROGRAM."
                                        :REM*194
70 PRINT"RUN/STOP-RESTORE DE-ACTIVATES PRO
   GRAM."                               :REM*145
80 DATA 120,169,121,141,20,3,169,207,141,2
   1,3,88,96,165,203,205,218,207  :REM*157
90 DATA 240,19,141,218,207,201,4,240,15,20
   1,5,240,27,201,6,240,39,201,3   :REM*53
100 DATA 240,60,76,49,234,56,32,240,255,32
    ,255,233,224,0,240,1,202,24,76 :REM*11
110 DATA 210,207,56,32,240,255,32,255,233,
    224,24,240,1,232,24,76,210,207 :REM*43
120 DATA 56,32,240,255,142,219,207,32,255,
    233,224,24,240,4,232,76,189    :REM*175
130 DATA 207,24,174,219,207,76,210,207,24,
    162,23,160,0,32,240,255,76,49 :REM*239
140 DATA 234,64,23,0,0,25          :REM*220
```

—LEONARD LENIEWSKI, SHAWNEE, OK

$4F7 ALL-PURPOSE ROUNDER

A routine is usually needed for rounding out calculations, especially if currency (dollars and cents) is being calculated. Here's a handy mathematical formula for rounding numbers to the number of decimal places specified in the variable DP:

```
10 DEF FN RD(X) = INT(X*10↑DP + .5)/10↑DP
```

Now, whenever a calculation needs to be rounded, set DP to the correct number of decimal places. Along with the statement in line 10 above, here's the rest of the code needed to round the square root of 5 to 2 decimal places and print the result:

```
20 DP = 2
30 PRINT FN RD(SQR(5))
```

—MIKE FOWLER, ABBOTSFORD, B.C., CANADA ■

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MEGA-MAGIC

Scroll, scroll, scroll your background, gently up the screen.

This program jazzes up a text display screen on the C-128 in 80-Column mode by animating the background with a smooth scrolling display that rivals the Amiga.

Type in the demo program. It'll poke in the machine language, then create a simple display to show the scrolling effect. The machine language is in the form of a Basic loader in lines 150–510. Incorporate this part of the listing into your own programs and activate it with SYS DEC ("0B00"). It will then scroll the screen until you press a key, whereupon the screen clears and returns program control to you.

The effect is generated by continuously redefining the space character in the uppercase/graphics character set (which is in VDC RAM in 80-Column mode). I used a simple grid pattern for the effect, but you can use your own sets of data to generate other effects. (A second set of values for you to experiment with are in the Data statements.)

When you need a space character for purposes other than scrolling, use the lowercase/uppercase character set. And finally, you can change the scrolling speed by poking location 2975 with some value other than the default, 25.

To generate your own screens, print spaces to get the scrolling effect you want, or simply clear the screen and print other characters where you don't want the scrolling to appear. Then use the SYS command to get things scrolling.

—LOU WALLACE, *RUN* STAFF

Listing 1. C-128 Background Animator.

```
10 REM 80 COLUMN BACKGROUND ANIMATOR
                                        :REM*92
20 REM BY LOU WALLACE                   :REM*114
30 FAST:REM FAST MODE WORKS BEST        :REM*171
40 GOSUB 150                            :REM*116
50 PRINTCHR$(142);"{SHFT CLR}{5 CRSR DNs}"
                                        :REM*11
60 PRINT"{20 CRSR RTs}{CTRL 9}{CTRL 6} {38
   COMD @s} {CTRL 0}{CTRL 4}"           :REM*132
70 FOR I=1 TO 10                        :REM*212
80 PRINT"{20 CRSR RTs}{CTRL 9}{CTRL 6}{COM
   D M}{38 SPACEs}{COMD G}{CTRL 1} {CTRL 0
   }{CTRL 4}"                           :REM*253
90 NEXT                                 :REM*220
100 PRINT"{20 CRSR RTs}{CTRL 9}{CTRL 6} {3
   8 COMD Ts} {CTRL 1} {CTRL 0}{CTRL 4}"
                                        :REM*214
110 PRINT"{21 CRSR RTs}{CTRL 9}{CTRL 1}{40
    SPACEs}{CTRL 0}{CTRL 4}"            :REM*170
120 PRINT"{HOME}{12 CRSR DNs}{31 CRSR RTs}
   {CTRL 9}{CTRL 6}{CTRL O}YOUR MESSAGE H
   ERE{CTRL 0}{CTRL 4}"                 :REM*56
130 SYS DEC("0B00"):PRINT"{SHFT CLR}"
                                        :REM*103
140 END                                 :REM*13
150 FOR I=DEC("0B00") TO DEC("0BF7"):READ
   A:POKE I,A:NEXT:RETURN               :REM*73
160 REM POKE 2975 WITH A DIFFERENT VALUE T
   O SPEED UP                           :REM*235
170 REM OR SLOW DOWN THE DISPLAY        :REM*207
180 DATA 173,0,255,141,182,11,165,14,141,0
   ,255,169                             :REM*183
190 DATA 0,141,179,11,32,82,11,160,0,32,22
   8,255                                :REM*12
200 DATA 240,10,32,134,11,173,182,11,141,0
   ,255,96                              :REM*43
210 DATA 140,180,11,172,179,11,185,184,11,
   172,180,11                           :REM*229
220 DATA 32,108,11,238,179,11,200,192,8,20
   8,218,32                             :REM*247
230 DATA 150,11,160,0,173,179,11,201,64,20
   8,5,169                              :REM*15
240 DATA 0,141,179,11,32,82,11,76,21,11,16
   2,18                                 :REM*169
250 DATA 169,34,32,96,11,232,169,0,32,96,1
   1,96                                 :REM*103
260 DATA 142,0,214,44,0,214,16,251,141,1,2
   14,96                                :REM*33
270 DATA 141,183,11,173,0,214,41,32,240,24
   9,173,0                              :REM*90
280 DATA 214,41,32,240,249,173,183,11,162,
   31,32,96                             :REM*22
290 DATA 11,96,32,82,11,160,0,169,0,32,108
   ,11                                  :REM*148
300 DATA 200,192,8,208,248,96,160,0,140,18
   1,11,172                             :REM*122
310 DATA 181,11,192,25,208,3,76,178,11,160
   ,0,200                               :REM*88
320 DATA 192,0,208,251,238,181,11,76,155,1
   1,96,0,0,0,0,0                       :REM*82
330 REM CHANGE THE FOLLOWING 8 CHARACTER D
   EFINITIONS (64 BYTES)                :REM*188
340 REM IF YOU WANT TO USE A DIFFERENT PAT
   TERN                                 :REM*135
350 DATA 255,1,1,1,1,1,1,1              :REM*41
360 DATA 2,2,2,2,2,2,2,255              :REM*44
370 DATA 4,4,4,4,4,4,255,4              :REM*90
380 DATA 8,8,8,8,8,255,8,8              :REM*81
390 DATA 16,16,16,16,255,16,16,16       :REM*225
400 DATA 32,32,32,255,32,32,32,32       :REM*246
410 DATA 64,64,255,64,64,64,64,64       :REM*243
420 DATA 128,255,128,128,128,128,128,128
                                        :REM*71
430 REM REM OUT LINES 340-410 FOR A DIFFER
   ENT PATTERN                          :REM*211
440 DATA 128,64,32,16,8,4,2,1           :REM*254
450 DATA 64,32,16,8,4,2,1,128           :REM*30
460 DATA 32,16,8,4,2,1,128,64           :REM*166
470 DATA 16,8,4,2,1,128,64,32           :REM*89
480 DATA 8,4,2,1,128,64,32,16           :REM*190
490 DATA 4,2,1,128,64,32,16,8           :REM*224
500 DATA 2,1,128,64,32,16,8,4           :REM*150
510 DATA 1,128,64,32,16,8,4,2           :REM*86
```

■

RUN it right: **C-128, in 80-Column mode**

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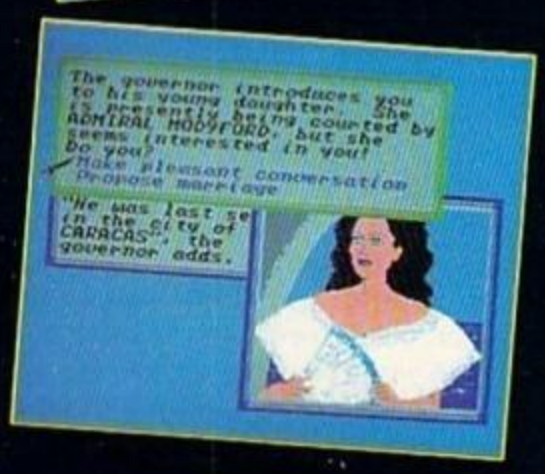
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Propose marriage
"He was last se in the city of CARACAS," the governor adds.

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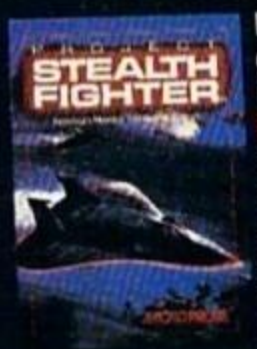

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NEWS AND NEW PRODUCTS

Meet the winners of the SPA awards and look at the plethora of games this holiday season.

Compiled by HAROLD R. BJORNSEN

WIZARDRY II

OGDENSBURG, NY—Sir-Tech Software (PO Box 245, Charlestown Mall, Ogdensburg, NY 13669) has released Wizardry II: Knight of Diamonds, the sequel to Wizardry I: Proving Grounds of the Mad Overlord. Characters developed in Wizardry I are used to maneuver in the six-level, 3-D, full-screen maze. New features include new graphics, finding over 100 items and battling over 100 monsters. It's available for the C-64 for $39.95.

Check Reader Service number 400.

AND THE WINNERS ARE. . .

WASHINGTON, DC—This past September, the Software Publishers Association announced the software awards given at its Fourth Annual Conference. To qualify, the software must have sold more than 50,000 for a silver label, more than 100,000 for a gold label and more than 250,000 for a platinum label. Many awards went to software available in Commodore versions.

PLATINUM

Accolade: Hardball; Test Drive.

Broderbund Software: Where in the World is Carmen Sandiego?; Print Shop Companion; Load Runner.

Data East USA: Karate Champ; Karnov.

Electronic Arts: Music Construction Set; Advanced Flight Trainer; Pinball Construction Set; Skyfox.

Epyx: Summer Games I; Winter Games; California Games; FastLoad Cartridge.

MicroProse Software: Gunship.

The Learning Company: Reader Rabbit.

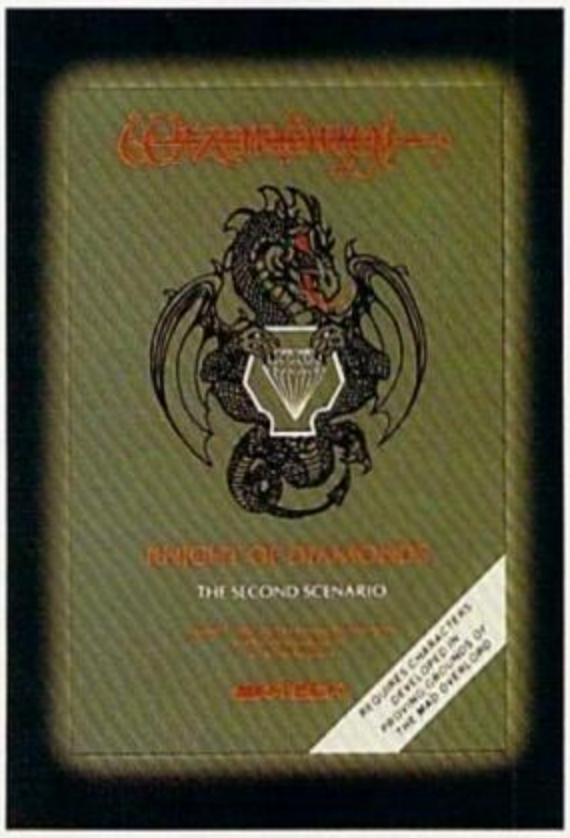
GOLD

Accolade: Ace of Aces.

Mediagenic: NBA Championship Basketball: Two-on-Two; Shanghai; NFL Championship Football.

Broderbund Software: Where in the USA is Carmen Sandiego?

Electronic Arts: Adventure Construction Set; Chuck Yeager's Advanced Flight Trainer; Marble Madness; Arcticfox; Financial Cookbook.



You'll find many surprises in Sir-Tech's Wizardry II: Knight of Diamonds.

Epyx: World Games; Destroyer; Temple of Apshai; Jumpman; Jumpman, Jr.; World's Greatest Baseball; Sub Battle Simulator; Pit Stop; Pit Stop II.

Hi Tech Expressions: PrintPower; Awardware.

IntelliCreations: Bruce Lee; Zaxxon.

Spectrum HoloByte: Gato.

SILVER

Accolade: Spy vs. Spy; 4th & Inches.

Mediagenic: Aliens.

Broderbund Software: Print Shop Graphics Library.

Data East USA: Ikari Warriors.

Davidson & Associates: Algeblaster; Speed Reader II.

Electronic Arts: Movie Maker; PHM Pegasus; Touchdown Football; Skate or Die; Legacy of the Ancients; Mail Order Monsters; Lords of Conquest; Archon II: Adept; Super Boulder Dash; World Tour Golf.

Hi Tech Expressions: Big Bird's Special Delivery; Astro Grover.

IntelliCreations: Alternate Reality: The City.

The Learning Company: Magic Spells; Gertrude's Secrets.

MicroProse Software: Pirates!; Airborne Ranger.

New World Computing: Might & Magic.

Strategic Simulations: Phantasie.

SOFTWARE ON VIDEO!

MOUNTAINSIDE, NJ—Twenty software developers in the U.S. and Canada have been brought together in a video showcase of their newest products. Included are discussions and demonstrations of what to look for in the latest art, music, video, desktop publishing, entertainment, word processing, educational and business applications software. The video represents software from several popular manufacturers, including Commodore. The Educational Video is available for $39.95, plus $5.05 postage and handling, from VideoAdvantage, Dept. 73, 1229 Poplar Ave., Mountainside, NJ 07092.

Check Reader Service number 403.

AIR/SPACE FIGHTS

GLEN ROCK, NJ—Two new games, priced at $34.95 each for the C-64, are offered by Absolute Entertainment (PO Box 116, Glen Rock, NJ 07452).

F-18 Hornet simulates taking-off and landing a carrier-based fighter jet. Each training, aerial assault, emergency supply drop and bombing mission tests whether you have the right stuff to fly America's premier fighting machine.

Space, an intergalactic adventure, takes you on a journey across 512 space sectors, complete with 64 different planets and countless asteroids and enemy attackers.

Check Reader Service number 401.

WHAT'S MY DEVICE #?

BRIGHTWATERS, NY—Changing the device number of your C-128D computer, 1541, 1541-II, 1571 or 1581 disk drive can now be accomplished with the press of a button. The Electronic Disk Drive Device Selector, a hardware addi-

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tion, installs with no soldering or knowledge of electronics required. EDDDS also includes a digital display showing the current drive number. It's available for $65, plus $4 shipping and handling, from RainbowTech Electronics, PO Box 19, Brightwaters, NY 11718.

Check Reader Service number 402.

Simply Irresistible

SAN MATEO, CA—Electronic Arts (1820 Gateway Drive, San Mateo, CA 94404) is distributing Virgin Games' computerized version of the board game, Scruples. Called A Question of Scruples, the C-64 social game of moral dilemmas incorporates a database of over 230 questionable situations. It can be played with up to nine friends or solo with companions chosen from a group of 64 computer characters. Each character has its own personality and an animated face. With all questions based on a participant's moral point of view, a wide range of responses is possible, and no two games are ever the same. The game retails for $39.95.

Check Reader Service number 404.

Let Freedom Ring

NEW YORK—The Freedom Stick is a remote-controlled joystick that lets you play games or use any software utilizing a joystick at over 20 feet away from the monitor screen without the nuisance of wires.

The stick gives you a choice of using an automatic rapid-fire switch or manual action. Its design allows you to aim the stick as much as 90 degrees away from the screen and still hit the target.

It also has two controllers for simultaneous two-player games. The Freedom Stick is available for $69.95 from Camerica, 230 Fifth Ave., Suite 1100, New York, NY 10001.

Check Reader Service number 405.

Nibbles From *Science Digest*

PAPER CHASE—Although computers are running rampant all over the world, 95 percent of the world's information is still stored on paper.

GO FOR IT—Taiwan-based MultiTech is offering a $1.3 million prize for the first program that can beat a human master at the Chinese board game, Go. Smaller prizes are being offered for chess programs.

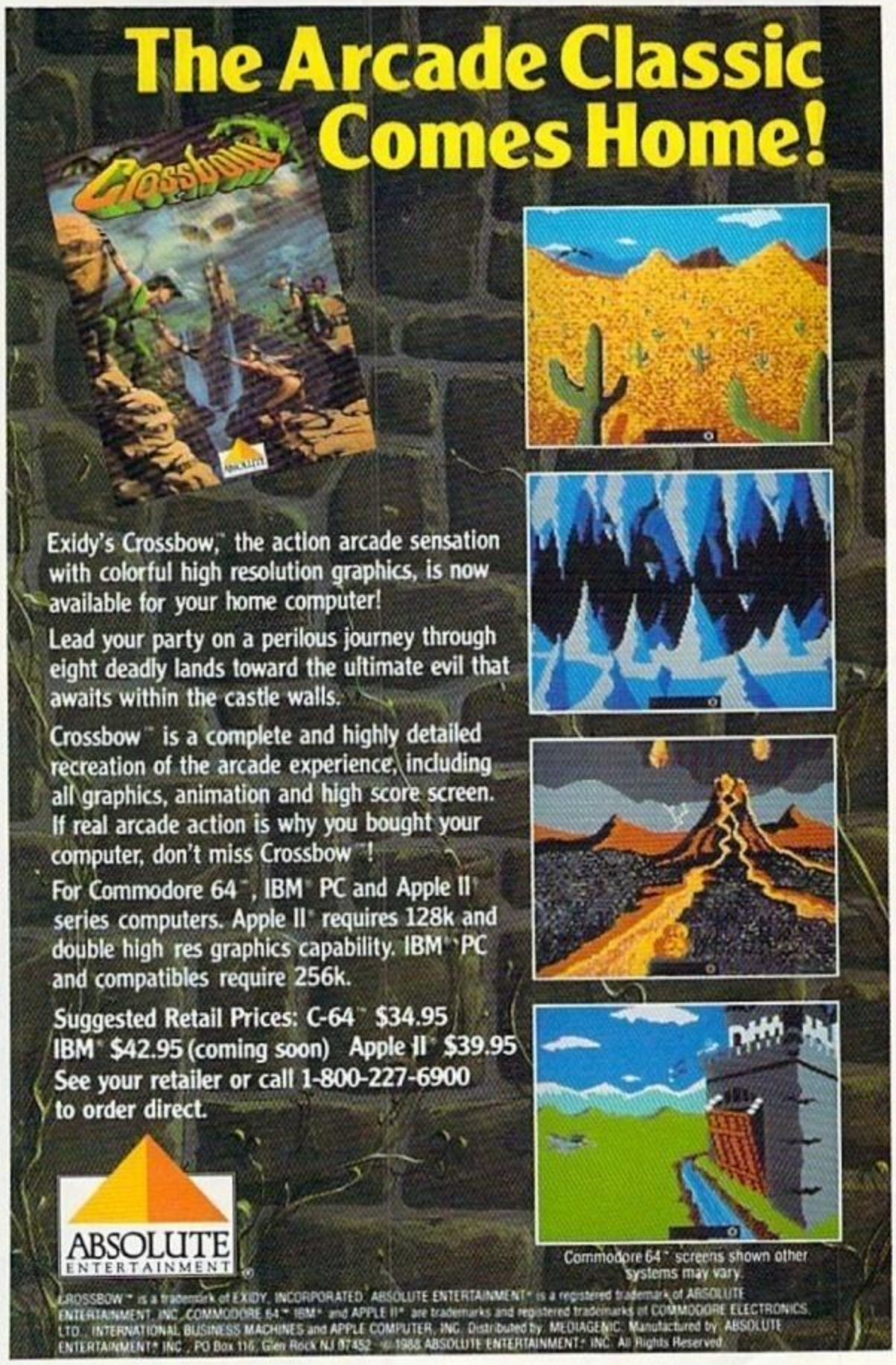
WIN, PLACE AND SHOW—People involved in research and development were polled with the question, "What was the most significant technical advance of all time?" Computers came in third with 10.7 percent of the vote. Antibiotics came in second, and, obviously, harnessing electricity came in first.

PAINT JOB—David Siegel of Palo Alto, California, will paint your Commodore computer system to match your decor for a fee, starting at $195.

PRAISE BE TO ALLAH!—Saleh of Saudi Arabia owns four houses with a wife living in each. The arrangement created a scheduling nightmare until he used his personal computer to do the scheduling for him. Now his wives are happy. We bet he is too.

GETTING AN EARLY START—The average age of persons accused of computer crimes is 22 years.

THAT'S PROGRESS—In 1981, it cost $1037 for computer equipment capable ►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Crossbow™ is a complete and highly detailed recreation of the arcade experience, including all graphics, animation and high score screen. If real arcade action is why you bought your computer, don't miss Crossbow™!
For Commodore 64™, IBM® PC and Apple II® series computers. Apple II® requires 128k and double high res graphics capability. IBM® PC and compatibles require 256k.
Suggested Retail Prices: C-64™ $34.95
IBM® $42.95 (coming soon) Apple II® $39.95
See your retailer or call 1-800-227-6900 to order direct.
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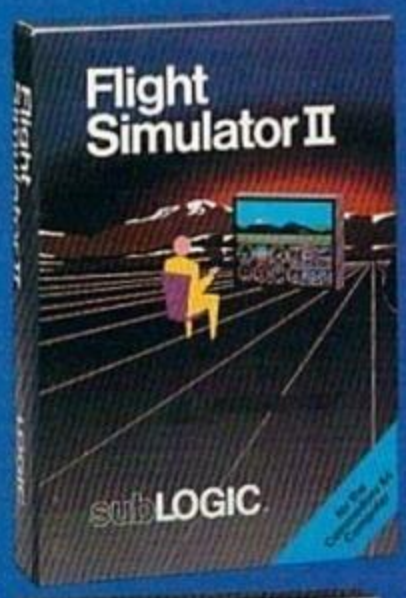

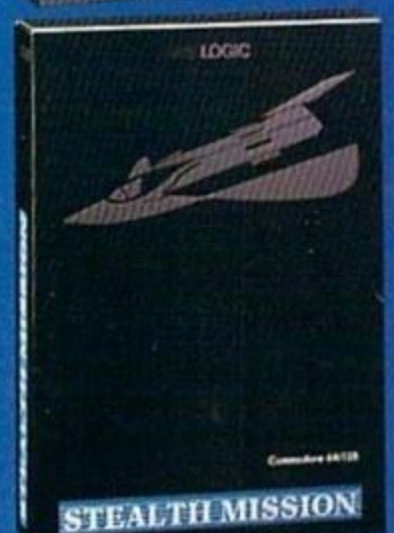

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Winner of the 1988 CES "Best Strategy Game" Software Showcase Award. This advanced-technology strategic simulation is a stunning success, with sales challenging those of Flight Simulator. With nothing comparable on the market (despite similar titles), Stealth Mission's programming polish and strategic gaming excellence set new industry standards. Scenery Disk compatible.

JET

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This award-winning jet fighter simulator defines the state of the art in action/combat simulation. Exciting and beautiful carrier-based sea missions complement multiple land-based combat scenarios. Jet's quick-reading documentation and easy flight controls provide unequalled action and fun. Scenery Disk compatible.

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WELL, BLOW ME DOWN!—Entire-Control is a computerized system with a digital dashboard display that monitors the air pressure in your car's tires, and deflates or inflates the tire as needed. The $400 system is from TechniGuidance.

DISKPOSABLE

PITTSBURGH—Tech-Sa-Port (PO Box 5295, Pittsburgh, PA 15206) announces the FloppiClene Bulk Kit with 50 100-percent disposable cleaning disks for maintaining and cleaning the heads in floppy disk drives. The disks use the wet/dry cleaning technique to clean drive heads after every 40 hours of use, and they come in 3½- and 5¼-inch formats for Commodore-compatible disk drives. The kit is available for $35.

Check Reader Service number 406.

SPEEDY PROGRAMMING

SAN FRANCISCO—Xytec (1924 Divisadero, San Francisco, CA 94115) has released Macro Set 1, for use on the C-64 with Commodore's Assembler Development System.

MS-1 contains more than 100 assembler macros and subroutines for speeding up program development by reducing time spent in the design, coding, key entry and testing associated with serial I/O, keyboard and screen I/O, large-number arithmetic, the limitations of eight-bit registers, common subroutines and debugging. The package includes an 81-page programmer's reference guide. Available for $35.

Check Reader Service number 415.

A HERO IS NOT A SANDWICH

LONDONDERRY, NH—In Ultima V: Warriors of Destiny, Lord British, ruler of Britannia, has been lost on an expedition to a newly discovered underworld. In his absence, Blackthorn, one of his trusted knights, has assumed command of Britannia, tightening his tyrannical grip on the empire. Rescuing Britannia from Blackthorn's oppression is the charge of the computer adventurer. $59.95.

In Times of Lore, a fantasy role-playing and arcade action game, you are a hero for hire, facing endless combat in a world teeming with assassins, wizards and monsters. Along the way you'll meet over 60 characters and explore over 45 buildings. $39.95. Both games, for the C-64, are from Origin Systems, 136 Harvey Rd., Bldg. B, Londonderry, NH 03053.

Check Reader Service number 416.

BATTLES TO THE DEATH

WOOD DALE, IL—Konami (815 Mittel Drive, Wood Dale, IL 60191) will be releasing five new games for the C-64 over the remainder of 1988 and into 1989. Prices had not been set at press time.

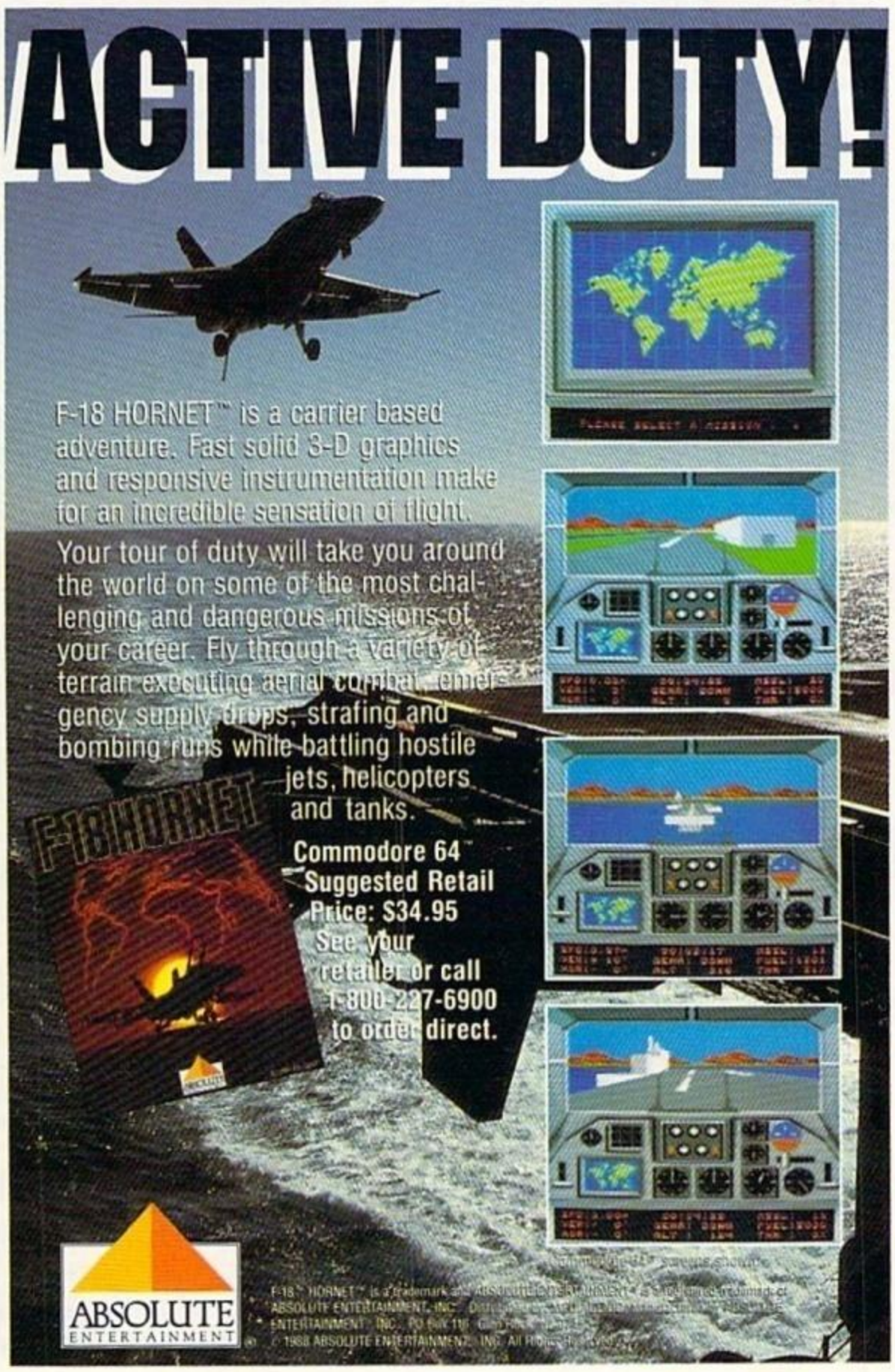
First of all, there is Ajax, wherein players engage in aerial combat with jet fighters, tanks, helicopters, ships and aircraft carriers to save Earth.

Next is Castlevania. Players fight goblins, ghosts, demons, wolves and bats, all thirsty for blood, and come face to face with Count Dracula.

In Metal Gear, players must protect the world from Vermin CaTaffy, who has activated the ultimate weapon of destruction.

Life Force has you battling Zelos, the planet-eating alien. You must save Earth with ripple lasers and plutonic missiles.

Finally, in Teenage Mutant Ninja Turtles, you team up with heroes in the half ►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shell, amphibians of comic book and action figure fame, to fight off the Evil "Foot" Clan in the sewers of New York.

Check Reader Service number 409.

SHAKE, WRESTLE & ROLL

MENLO PARK, CA—Four new games for the C-64 come from Mediagenic (3885 Bohannon Drive, Menlo Park, CA 94025).

The wrestling game, Take Down, breaks all the rules with outrageous characters and ridiculous wrestling that's just like the "real thing." Players begin by choosing a two-man team among eight wrestlers. Then players can begin to pound and pulverize for tag team supremacy. $29.95.

In Ocean Ranger, a simulation of a next-generation missile ship, you battle in four of the major military hot spots of the world, encountering a non-stop firestorm as you captain the ship toward the destruction of primary and secondary targets, protecting U.S. interests and ridding the world of a few communist insurgents along the way. $34.95.

In Predator, based on the Arnold Schwarzenegger movie of the same name, you assume the role as leader of an elite military rescue team. But as your crack commando unit is destroyed, you find yourself alone, stalked by an alien manhunter, the Predator. $29.95.

Rampage, an action game, has one or two players controlling one of three nasty creatures on a rampage of destruction from coast to coast, with up to 157 cities to destroy. $34.95.

Check Reader Service number 411.

WAR ROOM STRATEGY

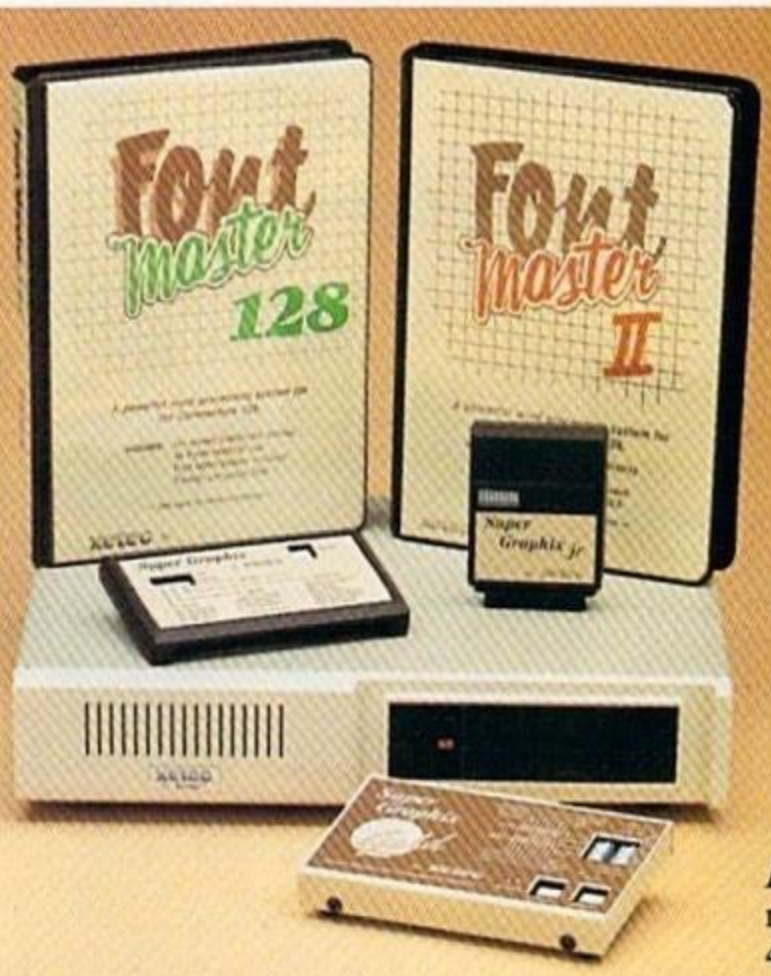
BOUNTIFUL, UT—Heavy Metal, a war simulation, arcade action and strategy game for the C-64, begins in the war room where you devise a strategy to overcome enemy positions. Once the strategy is set, you move directly to the front line, commanding any of three modern weapons systems, which include the army's most sophisticated main battle tank, a defense weapon against air and ground attack, and a fast attack vehicle to storm outlying enemy supply stations. It's available for $39.95. Access Software, 545 West 550 South, Suite 130, Bountiful, UT 84010.

Check Reader Service number 410.

STOP A VIOLATION

PARRY SOUND, ONTARIO—Total Security is a software alarm system that can be used in any type of building. Sensors (available in electronics stores) can be wired to a joystick cord to detect entry. The program gives an audible alarm over the monitor speaker and telephones any two phone numbers (modem required) when a violation (anything from a break-in to a failed heating system) occurs. It also prints out the time and area of the violation. There are ten separate channels to connect sensors. The C-64 package sells for $29.95 ($39.95 Canadian) from Megasoft Canada, PO Box 10, Parry Sound, Ontario, Canada P2A 2X2.

Check Reader Service number 413. ■



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FontMaster II – a powerful word processor for the C-64 with 30 fonts ready to use, 65 commands, font creator, data merging, super- and subscripting, italicizing and more.

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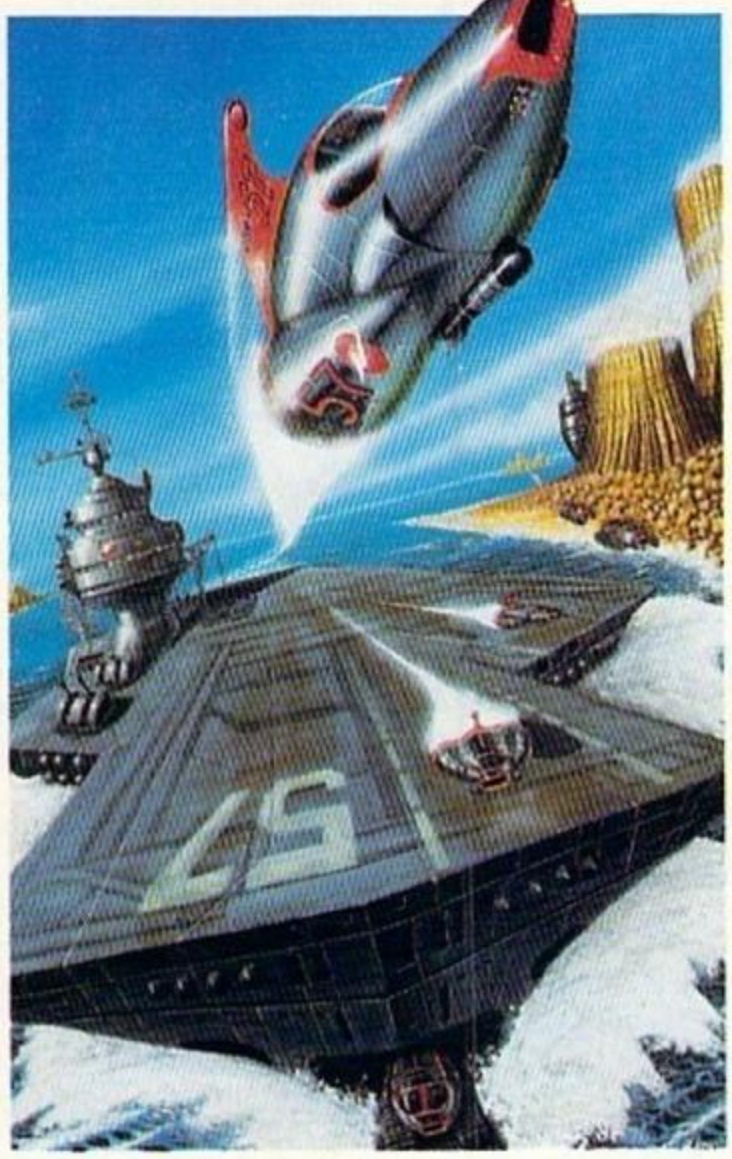

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MAIL RUN

Readers get bit by the gambling bug, defend mail order and disagree with a software evaluation.

CHERNOBYL A DISASTER?

I was astonished to see the B+ you gave in your Software Gallery review of Chernobyl in the July 1988 issue. To me, this is a most inaccurate evaluation by your reviewer. Personally, I'd place it somewhere between a D and an E. The documentation alone would consign this piece of software to my wastebasket.

—ELLIS F. KING
CAMARILLO, CA

We've heard both good and bad about Chernobyl. Readers, what are your opinions?

—EDITORS

MORE MAGIC

A while back you published a booklet of Magic tricks called *Limited Edition—RUN's The Best of Magic*. Are you going to publish a similar booklet with more recent items?

—DAVID PELLER
SILVER SPRING, MD

We have no plans to publish another Limited Edition of Magic tricks in the immediate future. However, look for this year's Special Issue, available around the beginning of January, which will contain about 50 never-before-published Magic tricks.

—EDITORS

IN DEFENSE OF M.O.

I'd like to reply to Mark Riesselman's comments ("Pluses and Minuses," Mail RUN, July 1988). I'm sorry he's had so much trouble with his mail orders, but I feel it's unfair to blame the mail order industry in general.

When I returned from West Germany (where, by the way, I could get anything I wanted for my Commodore), I couldn't find a store in my area that had a 1571 disk drive. I ordered one from Lyco Computers of Jersey Shore, Pennsylvania, and I received it in about seven days. I've also enjoyed good service from Software Discounters of America (Pittsburgh) and VSI (Portland, OR).

Mark might have had bad luck, but there *are* good companies who care about their customers. Sure, there are some who don't care, but in the end, they file for bankruptcy.

—ROGER C. NELSON
FORT STEWART, GA

GERONIMO!

I'm experiencing difficulties with the campaign mission, "Create a Diversion," in MicroProse's strategy and action-simulation, Airborne Ranger. I've followed the instructions to avoid enemy contact and not to fire the weapon until I hear a beep, whereupon I keep up the diversion. But, at the end of the mission, the program claims that I alerted the enemy prematurely. How do I resolve the problem without having to use a new ranger?

—DAVID MILILLO
SCHWENKSVILLE, PA

This is a common question from Airborne Ranger players. To successfully complete the "Create a Diversion" scenario, parafoil out of the airplane and wait at the position where you land until you hear five beeps. At that point, begin making noise to create the diversion. If you hear another set of beeps, you're not making enough noise. If you hear still another beep after the second set, your noise wasn't sufficient, and the mission won't be successfully completed. If you don't hear any more beeps, continue making noise until time runs out, and you're picked up by the plane. We thank Kimberly A. May, MicroProse's Customer Service Manager, for the information.

—EDITORS

ANTE UP!

After using "Video Poker" by Tony Brantner (*RUN*, August 1988), I really found myself hooked on it and thought there might be other readers who feel the same and would like to participate in a high-score tournament (no money is involved). Any interested readers should send me a business-size SASE for details and an entry form. The form should then be sent back to me, completed, with a photo of the screen showing the high score during a two-hour period.

—MICHAEL PULLMAN
2712 WOODLAWN AVE.
NIAGARA FALLS, NY

KUDOS FROM LAS VEGAS

Congratulations and my thanks to Tony Brantner for his superlative Video Poker game that appeared in the August 1988 issue of *RUN*.

In Las Vegas, video poker machines do not pay on a pair less than jacks. Can Tony modify and publish this change? I'm anxiously looking forward to the modification.

—RUSH HUGHES, JR.
LAS VEGAS, NV

Tony was gracious to supply us with the modification in short order. He says he originally wrote the program to pay on a pair of jacks or better, but felt that the version was too difficult to build up any winnings. At any rate, the following line changes should make it more interesting for die-hard poker fans.

```
1030 NEXT:NEXT:QZ = 0
1050 IFHV(Z) = HV(A)THENSV = SV + 1:
     IFZ< >ATHENQZ = QZ + HV(Z)
1130 IFSV = 7ANDQZ>17THENPV = 1
2220 DATA"JACKS OR BETTER",1
```

—EDITORS

HAPPY POKER FACE

Please extend my thanks to Tony Brantner for his Video Poker type-in program. Not only does his program have fine utilization of sound, color and graphics, but it was also easy to type in. I appreciated the short program lines and plentiful REM statements. The program is positively fun to play!

—SUSAN LADWIG
ROCHESTER, NY

A CALL TO READERS

Send your letters to Mail RUN, 80 Elm St., Peterborough, NH 03458. Each letter must include the writer's name and complete address. ■

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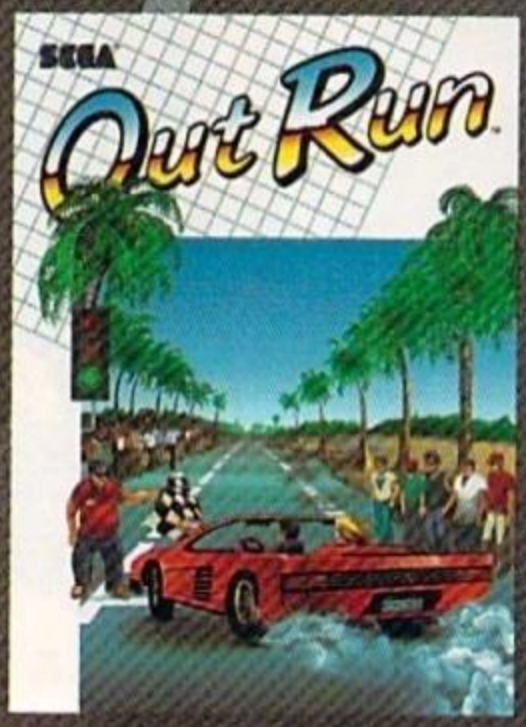

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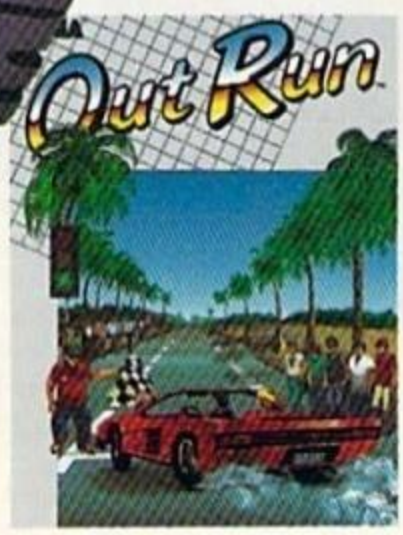

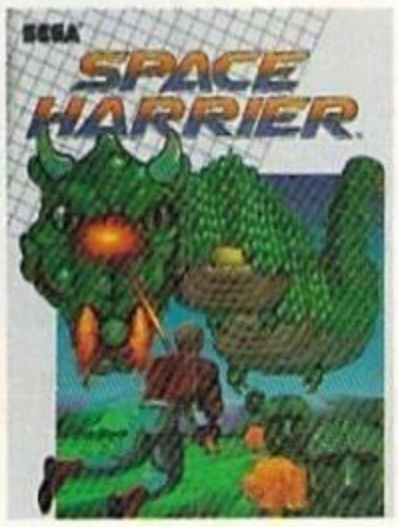

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SOFTWARE GALLERY

Software from Santa includes reviews of racing and submarine simulations and outer space and futuristic fantasies!

Compiled by BETH S. JALA

WASTELAND ..... A+

Futuristic Survival Of the Fittest

World War III had blown much of the civilized world into oblivion, leaving only isolated pockets of humanity to carry on. Over the years, as strange mechanized beasts and mutant creatures roamed the desert, the stray bands of civilization began to realize that there were others like them out in the Wasteland.

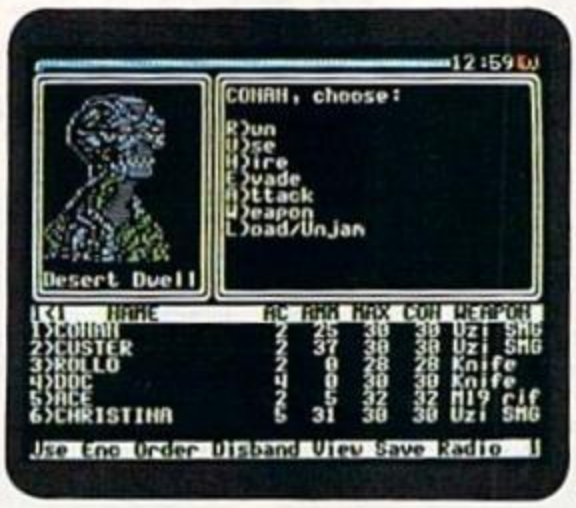
One brave outpost organized a colony called the Ranger Center. In the tradition of the Texas and Arizona Rangers of a century before, they formed a daring group of young men and women—the Desert Rangers. Their mission: seek out those in need of help and investigate the strange disturbances plaguing the Wasteland.

If you've ever had the opportunity to play any of the Bard's Tale series programs, then you'll immediately feel at home with Wasteland. The screen layout is almost identical. Creatures—some human, some not—are depicted in a large frame on the left side of the screen. All are beautifully drawn and many are animated.

A frame on the right smoothly scrolls the results of clashes and displays information pertaining to your character's actions. The lower half of the screen is reserved for the party roster. This section also contains vital information on armor class, constitution, ammunition and weapons-in-hand. Toss out your pitiful leather and swords, pilgrims, for they are no match against rockets, grenades, submachine guns and NATO assault rifles!

Winning against monsters and thugs is only half the battle in Wasteland. Your party must also deal with the petty town officials, gangsters, and solitary personalities scattered throughout the land.

What makes Wasteland particularly interesting is its use of each character's personal skills and abilities. As players gain experience and rank, they learn skills vital to their survival and success.



Wasteland's split-screen shows your character, his actions and equipment statistics.

I am impressed with Wasteland. Whether or not you like fantasy games, this program definitely appeals to a broad audience. The attention to detail is simply marvelous. Each new town and village contains puzzles and surprises that both frustrate and delight. The surroundings are depicted from an overhead view, and the graphics are nicely done, imparting a sense that the world has indeed been blown asunder.

As you progress through the adventure, you're often prompted to read from paragraphs found in a separate documentation booklet. These might give you a description of a room you've just entered, expound on a conversation with a Wasteland citizen, or offer clues about an interesting location.

As a software reviewer, there comes a time where I must stop playing a game, detach myself from all its pleasurable aspects and regard the package with a cool and objective eye. Well, I've got 30 plus hours invested in Wasteland and plan to invest at least another 30. Reviewing was never supposed to be this much fun! *(Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. C-64/$39.95.)*

—JOHN RYAN
BILOXI, MS

LETTERS FOR YOU ..... A–
NUMBERS COUNT ..... A–
OPPOSITES ATTRACT ..... B+

Computerized Crayons Keep Kids Coloring

One formula for creating popular software is to reproduce and improve upon the functions of non-computer- ►

REPORT CARD

A Superb!
An exceptional program that outshines all others.

B Good.
One of the better programs available in its category. A worthy addition to your software library.

C Average.
Lives up to its billing. No major hassles, headaches or disappointments here.

D Poor.
This program has some problems. There are better on the market.

E Failure.
Many problems; should be deep-sixed!

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By Dynamix, Inc. and Greg Johnson

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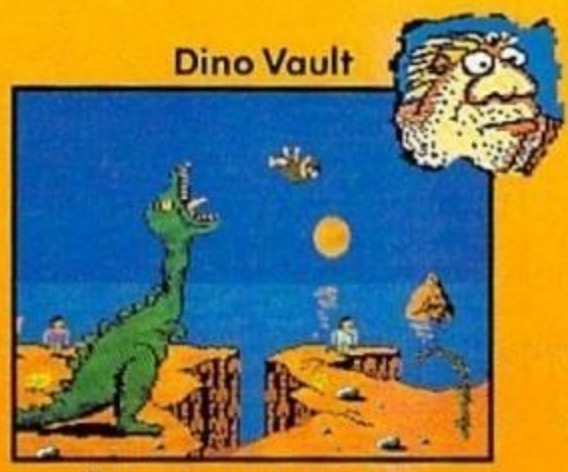
Clubbing

"Become one with club. Don't fall for look-at-birdie-in-sky trick. Don't check feet for fleas."
—Glunk.

Mate Toss

"Swing fast circles. Remember let go. Good for medals. Not good for getting dates."
—Crudla.

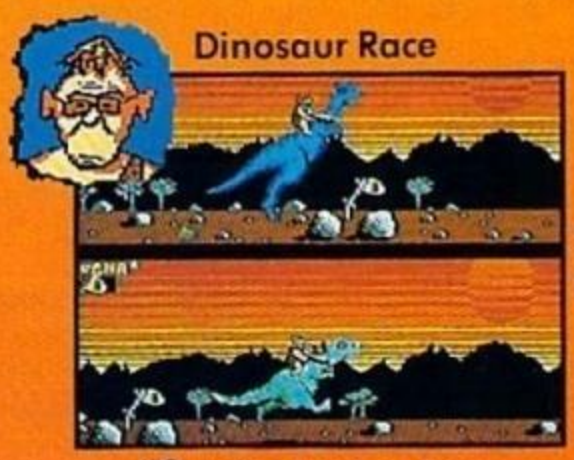
Dino Vault



"I like plant pole in totally cave-ular sand, soar high in air, wave to way-hungry dino."
—Thag.

The greatest Neanderthal athletes of all time share their secrets.

Dinosaur Race

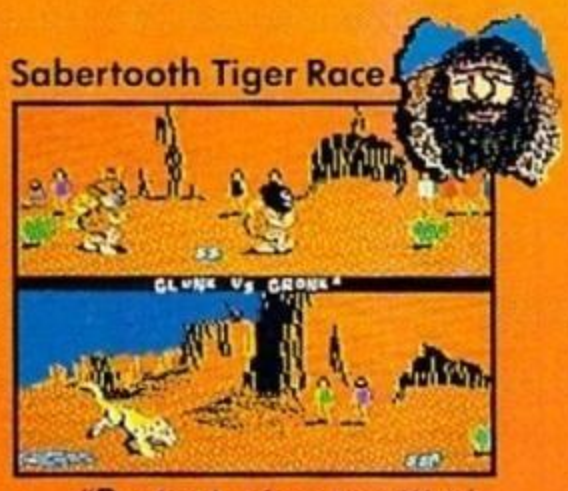


"Club dino head, go faster. Too much club, dino bite dust. Vincent hate dust."
—Vincent.

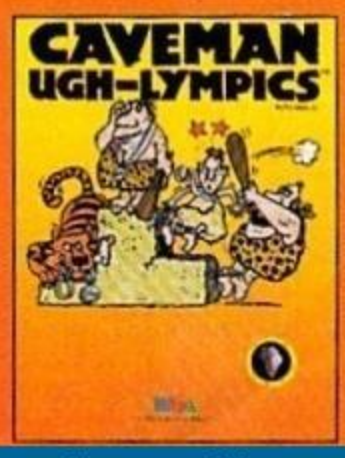
Firemaking

"Rub sticks fast. Make bright, ouchy, hot thing first. Try not get dizzy. Remember to duck."
—Ugha.

Sabertooth Tiger Race



"Run fast fast from tiger. Watch out for cactus. Trip other cave-guy. Him big lunch for kitty."
—Gronk.



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ized items. Word processing programs, for instance, sell so well because they do almost everything that typewriters can, and more. With its Sesame Street Crayon programs, Polarware has introduced software versions of coloring books. By creatively using Big Bird and the other Muppet characters, this series' three titles—Letters for You, Numbers Count and Opposites Attract—not only provide more entertainment than their non-electronic models, but also have solid educational value.

Each picture in the Letters for You program contains several objects that begin with the same letter, which is also displayed. Each image in Numbers Count has a group of objects whose quantity equals an on-screen number. In the Opposites Attract program, a pair of antonyms appears in the lower left corner of each picture, and the remainder of the scene illustrates the relationship between the two words.

With all three titles, a preschool child uses a joystick, the keyboard or a mouse. After choosing one of 16 colors with an electronic pointer, he or she then moves the pointer to where the color is to be applied. A simple press of a button or key automatically fills in the area.

Polarware has programmed many very attractive features into these packages. For example, at any time, a child can erase the color either from the last area that was changed or from the entire screen. Also, a preschooler is able to save to disk all of the "artwork" that was produced during a session at the computer. In addition, the programs print either a color or a black-and-white version of a screen on an Okimate 20 printer, while a Commodore 1200 is able to make only black-and-white copies.

Besides being very entertaining, the programs do an excellent job of using creative and artistic exercises to teach simple lessons about letters, numbers or the concept of opposites. The Sesame Street Crayon series also offers a subtler benefit. Traditional coloring, which is a common activity in kindergarten and the first few elementary grades, can be a difficult skill to master. In particular, many young children aren't able to keep their crayons within the lines of a picture. A preschooler who successfully uses the Polarware series can gain confidence that helps when he or she tries the "real thing."

Two of the software packages, however, have some relatively minor shortcomings. While Letters for You and Numbers Count worked with my fastload cartridge, my copy of Opposites Attract did not. At over 3¼ minutes, this program's loading time was more than 75 percent greater than that of the other two titles.

Also, the Letters for You instruction manual incorrectly indicates that a single keystroke can immediately bring any of the 26 pictures to the screen. Instead, according to Polarware's technical staff, a child must simultaneously press the shift key and the proper letter key to call up a particular scene.

Parents and teachers should also realize that the three programs might not be suitable for every preschooler. Certain children, for example, might become frustrated when they try to place the pointer's tip in the very small coloring areas that some pictures contain. And, some youngsters might not have the physical dexterity needed to operate a joystick, while others might not be sophisticated enough for the keyboard option, especially when two keys must be pressed simultaneously.

Nevertheless, I think that most adults will decide that Letters for You, Numbers Count and Opposites Attract are excellent additions to their family's software library. These low-priced electronic coloring books can not only provide a great deal of pleasure, but they can also aid a child's academic success. *(Polarware, 1055 Paramount Parkway, Suite A, Batavia, IL 60510. C-64/ $14.95 each.)*

—MARILOU LATOCHA
OAK PARK, IL

ARKANOID ..... A–

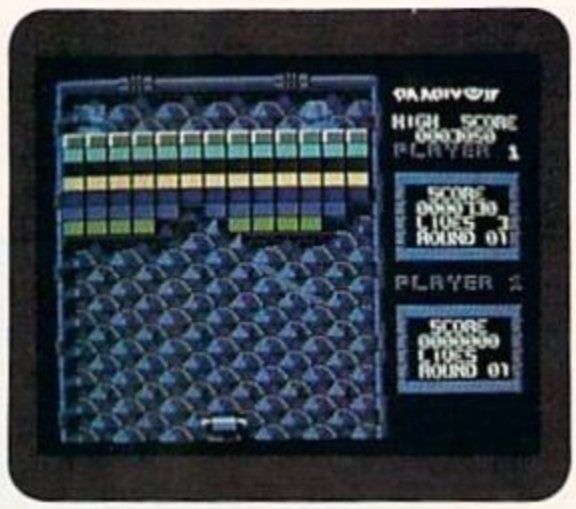
Reflexes: Ready, Set, Penetrate Those Brick Walls!

At first glance, Arkanoid would seem likely to generate less intensity than most other arcade conversions. The game's ball-and-brick scenario just doesn't appear as exciting as the gunfights of a Contra or the hand-to-hand combat of tag team wrestling. However, playing a few rounds of this Taito program quickly proves that surviving its hostile environment is at least as engrossing as succeeding in any other coin-operated adaptation.

Arkanoid's setting is outer space, and the bar that you control represents an interplanetary craft that deflects energy spheres. The game has 33 levels, each with a unique pattern of blocks. Some are indestructible, while others disappear after a ball hits them one or more times. You conquer a level by removing all the latter type of bricks from the screen.

Throughout the game, malevolent aliens wander about and divert balls from their intended paths. Also, the more time that is spent on a level, the faster a sphere travels and the harder it is to hit. You start with five balls and can obtain more with high point totals. The game ends when the last ball gets past the bar.

Fortunately, Arkanoid offers a number of control options: keyboard, joystick, mouse or paddle controller can



Blast your way through the brick walls in Arkanoid.

be used. The latter two devices are especially appropriate for the horizontal movement this game requires.

When certain bricks disappear, a labeled capsule is released. If the bar catches it, you receive one of seven different "powers," including a lengthening of the bar or a laser that can vaporize bricks. The necessity of learning how to effectively use the capsules adds a bit of mental challenge to the contest.

Arkanoid's graphics and animation are exceptionally well done, and each pattern of bricks is colorful and sharply defined. The game's sound effects, which include a futuristic rap theme, are also excellent.

However, the software demands a lot of you. For example, it takes a great deal of skill to precisely guide a ball to the last few target bricks on each level. Also, the software was programmed so that every new game begins on the first screen; as a result, some players may never get to the 33rd level. The software designers' lack of mercy is further illustrated by the absence of a pause button.

Nonetheless, fast-action enthusiasts who like their arcade conversions mean and nasty should relish Arkanoid. It can ►

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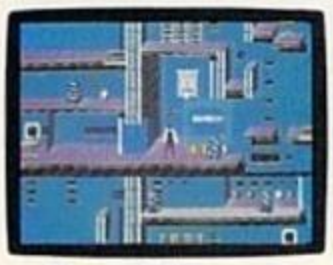
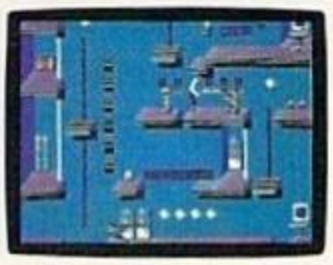
IF THIS IS THE FUTURE, THEN YOU'RE HISTORY.

Hold it. What's this? Human-seeking suicide robots? An evil mastermind bent on world annihilation?



There are 8 office towers to search, each with its own theme and level of difficulty.



Of course, Elvin's floor plans are almost as complicated as his global plans.

No wonder they call this mission impossible. Why, it's got even more strategy and action than the original top-selling Impossible Mission.™

The trick here is to collect the secret code numbers that will ultimately allow you to access Elvin's stronghold. And waste him before he wastes the world.

There are over 50 rooms to search for codes. Careful. The floors and catwalks in this place end a little abruptly. And of course, they're guarded by those pesky bots. But you've got an MIA9366B pocket computer to help you crack the security code. A working tape player to play music clues. And a map to show which towers you have or have not searched.

Go then. Elvin is preparing to launch his missile attack in less than ten hours. You must stop him. Or the world will be terminally late for dinner tonight.

IMPOSSIBLE MISSION II

BY EPYX

Commodore 64, IBM & compatibles, Atari ST, Apple II & compatibles, Amiga

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easily stir up as much adrenaline as any C-64 gun or grappling program. *(Taito Software, Inc., 267 West Esplanade, North Vancouver, British Columbia, Canada V7M 1A5. C-64/$29.95.)*

—WALT LATOCHA
OAK PARK, IL

MAINFRAME ..... B+

The Weight of the World Is on Your Shoulders

Don't look now, but the 20th century has ended in nightmarish fashion: TriComplex III dominates Earth. This super computer, consisting of a vast interconnected network of world-wide electronic systems, commands an army of robot destroyers and remote-controlled missiles.

Your battle with this colossus takes place on land, in the sea and in space. A secret satellite, Orbiter, is your home base; it lies outside Earth's atmosphere and guides your attack. Your goal is to restore freedom by "pulling the plug" on TriComplex III.

During play, you can switch to Orbiter and consult a display panel for various operations—energizing your "sweatsuit," recording inventory, teleporting to your ship, obtaining a status report, and so forth. Your joystick controls your movements—running, hopping, crouching, picking up various supplies, leaving or entering rooms, and shooting laser energy from your fingertips. If running tires you out, build an attack rover to ride in. But remember that if you get bumped into or zapped by the enemy too often, you disintegrate—forever.

There's more to this fascinating game, but it's best discovered in action. My favorite "search-and-plunder" involved the Scan Unit, which I could deposit at any location. It enabled me to spy on or teleport to faraway places. Equipment malfunctions proved irksome; these weren't software glitches—just TriComplex III jamming my devices!

The graphics, from the close-up view of Orbiter's display panel to the hills and caverns of Earth, are excellent. A jazzy tune kept me jumpy with suspense and racing with the beat!

Sometimes I grew a bit bored with the hopping and shooting routine, but overall, the game's features offer more than just action. The planning and spying you can do allow plenty of room for strategy and decision-making. You can play a defensive role and weigh the odds, or you can plunge forward madly and rely on quick reflexes. It's up to you to find the means to victory.

Recommended especially for the young crowd, MainFrame is "hopping" good. *(Microillusions; distributed by Mediagenic, 3885 Bohannon Drive, Menlo Park, CA 94025. C-64/$39.95.)*

—JOHN DIPRETE
CRANSTON, RI

JINXTER ..... B+

What's Luck Got To Do With It? Everything!

In case you're wondering why you haven't won the Lottery yet, the answer is really quite simple: *your luck is running out.*

A look at Jinxter's superb graphics.

You probably weren't aware of this, but all the luck in the world is controlled by a charm bracelet. And, as long as the bracelet and its five charms are intact, they serve to keep Jannedor and the Green Witches of Aquitania powerless. Lately, though, you've been stubbing your toe a lot more than usual, haven't you? Well, it seems Jannedor has stripped the bracelet of its charms and is preparing to do even more diabolical things now that she is no longer restrained.

There's a strange character wearing a Herringbone overcoat and eating a cheese sandwich—he's a Guardian. It's his job to get the charms and bracelet back and reassemble them. He's no fool, however—he's not going to put his life in jeopardy. Guess who's going to get stuck with the job?

Jinxter is a delight to play. From the moment you find your way into your house to the minute you complete your mission, you're going to be faced with some really clever and intriguing puzzles. This is not just a simple treasure hunt. A lot of thought has obviously gone into making the game just frustrating enough to keep things interesting. Some problems have to be solved by using the magic of the charms, others by using your wits, and still others can't possibly be solved unless your mind works in strange ways! But then again, if your mind didn't work in strange ways, you probably wouldn't be playing an adventure game!

Jinxter's graphics are truly superb, but totally unnecessary to the game. The hi-res pictures can be conveniently tucked up out of the way or set so they use only part of the screen. One feature not used in Jinxter, but present in previous Magnetic Scrolls (authors of The Pawn) games, is RAM Save. I wish it had been included in Jinxter, because it comes in handy during those times when you're completely at a loss and seem to constantly be getting killed.

Jinxter can be copied and also uses the now-familiar Magnetic Scrolls' password protection. The password is found in the excellent documentation that accompanies the game, and need only be typed in once during play as long as the game is in memory.

My only complaint about this game is the ending. I can't say too much about it without spoiling the outcome for those who have yet to play, but my guess is that the ending will probably disappoint most people. However, that certainly doesn't change the fact that this is one of the most enjoyable adventures I've ever played. *(Rainbird Software; distributed by Mediagenic, 3885 Bohannon Drive, Menlo Park, CA 94025. C-64/$34.95.)*

—ART LEWIS KIMBALL
TUSCOLA, IL

THE HUNT FOR RED OCTOBER ..... B

From the Novel To the Screen, Your Mission Continues.

The Hunt for Red October is one of the latest submarine simulations to hit the water. Like its predecessors, Red October lets you control your own navigation, propulsion and weapons systems. You're in command of a modern, nuclear-powered Soviet sub. Your mission is to avoid detection while making your way to the west for defection to the United States. In ex-

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change for political asylum, you've promised to deliver your state-of-the-art sub to the U.S. Navy.

From the outset, your crew believes that your mission is simply to approach U.S. coastal waters in the Atlantic as a test of American ability to detect submarines in the area. Once you rendezvous with the U.S. Navy, you must fake a leak in the sub's nuclear power plant and stage a scuttling of the Red October. To reach this successful conclusion, however, you must first outsmart, outmaneuver, and in some cases, out-fight U.S., NATO and even Soviet forces. Once the Soviets figure out what you're up to, they'll do anything, including sinking the Red October, to stop you.

The simulation begins near Iceland in the treacherous Reykjanes Ridge. To navigate your way through this area, you must rely on your sonar displays, contour maps, hydrophonics equipment and cross-sectional terrain displays, as well as your knowledge of the various propulsion and drive systems.

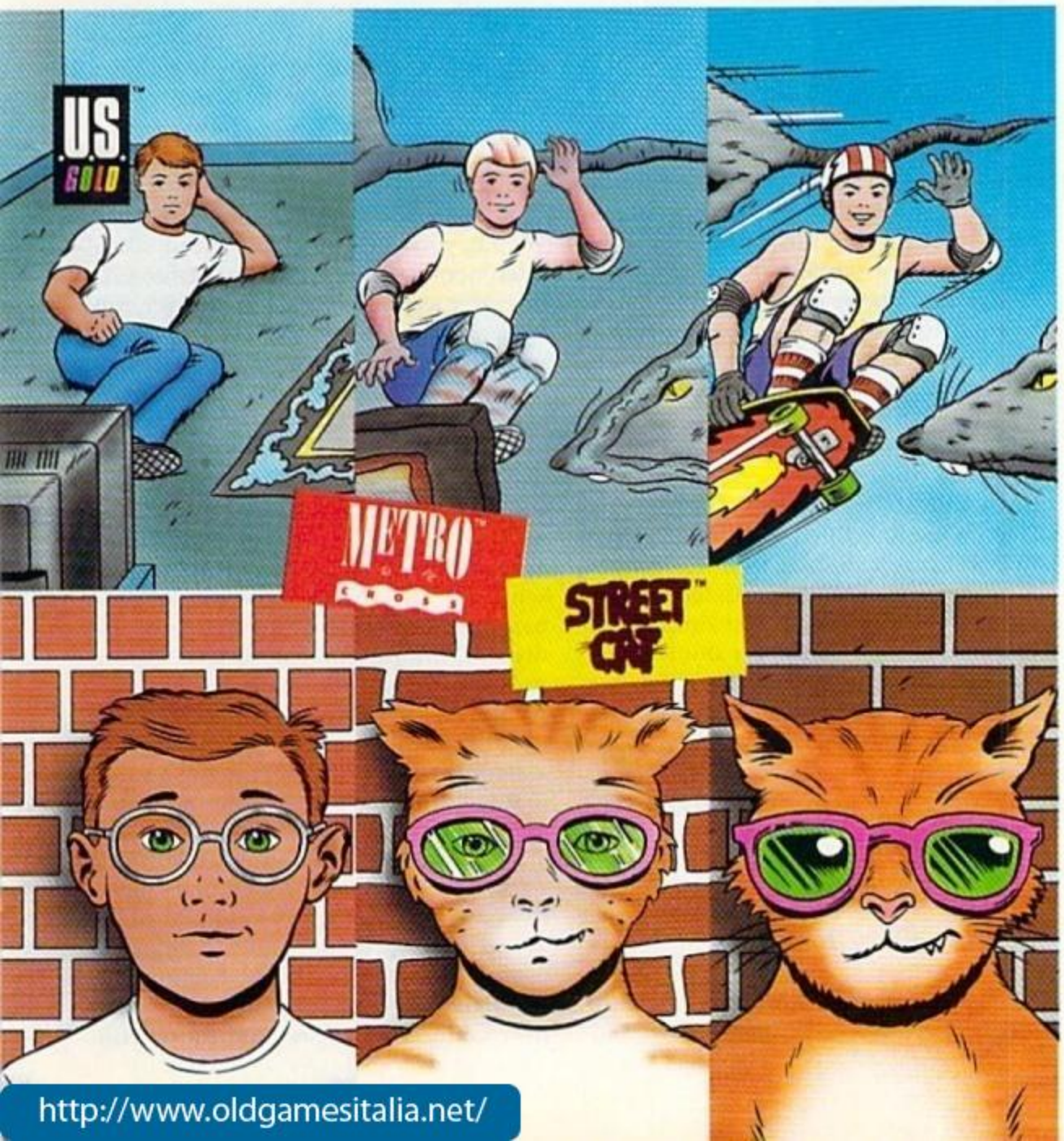
You've got your mission cut out for you in The Hunt for Red October.

There will be many instances when you'll have to defend your sub against attacks. For this purpose, the Red October is equipped with four torpedo tubes that are loaded with a total of 20 torpedoes. You can also release electronic decoys into the water to protect your sub against incoming enemy fire.

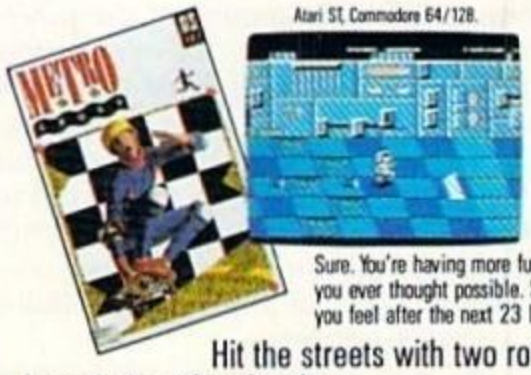
One way that Red October differs from other sub simulations is that this game doesn't require you to learn any keyboard commands. All orders are issued by clicking an arrow and sickle-shaped cursor on the appropriate icon.

As choices are made, a small message window displays the crew's acknowledgements of your orders. This is also where you receive important information concerning sonar contacts, damage to your sub and other news about enemy activity. The screen also shows your main control panel with a rotary compass, digital speed, heading and depth readouts, along with a map/contour display.

Red October is a difficult game to win, partly because of the nature of your mission. Somehow, it's easier to be the hunter than the hunted. To win, you have to master the sub's systems and maintain a vigilant monitoring of potential dangers, both from enemy ships and mines and from the ocean terrain. It's not an easy task, but Red October fortunately includes a Save feature, so you can move a little closer to the suc- ►



Atari ST, Commodore 64/128.



Sure. You're having more fun than you ever thought possible. See how you feel after the next 23 levels.

Hit the streets with two romps through the urban jungle.

First, *Metrocross*. A high-speed race through level after level of twisted subway tunnels. It's you against the clock. And a barrage of barriers bent on your destruction. Like rats the size of taxi cabs. Good thing you've got a skateboard and a catapulting springboard or two.

Or be the coolest cat in town in *Street Cat*. Navigate your way through a tangle of city streets. And compete in the craziest events ever dished up by man or computer. Like oozing your way through the slimy sewers. Or bowling for bulldogs. Whatever the event, it's sure to bring out the animal in you.

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No other game serves up brawny bulldogs for you to bowl over.

Amiga, Atari ST, Commodore 64/128.

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cessful completion of your covert mission each time you play. *(Datasoft; distributed by Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. C-64/$39.95.)*

—BOB GUERRA
SOUTH BOSTON, MA

STAR EMPIRE ..... B

Space Can't Be
The "Final Frontier;"
Here's Another Simulation!

I admit it: I'm an Elitist. It's not that I imagine my station in life to be grander than others. What I mean is that I absolutely love playing Elite, the classic space adventure from Rainbird. As rich and satisfying as Elite is, it's not surprising that imitations would materialize on the heels of that old favorite's success.

While I wouldn't classify Star Empire as an exact imitation, it can obviously claim roots that are firmly planted under the shadow of Elite's achievement. The scenario is quite familiar: outfit a scout ship, explore a vast galaxy, trade with far-ranging empires, fight aliens, pursue missions, earn enough money to modernize the ship and, finally, command the power to rule and protect entire star systems.

While I've over-simplified the events surrounding Star Empire, I can say that however much it might resemble other programs, it can stand on its own, partly because of its superb graphics and fluid game play, and partly because of the richly detailed universe it creates.

The object of Star Empire is to acquire star systems and eventually gain the wherewithal to build a huge "frontier shield" to protect them. This isn't something that can be accomplished in one sitting. Playing Star Empire must be a commitment, if only because of its size and sophistication. In other words, the shield is the long-range goal; surviving is a more immediate aim.

For most of Star Empire, the view is that of your ship's control panel, with an overhead display of the scout ship. The instruments depict energy and shield strengths and temperature and radiation levels, as well as two separate directional pointers for navigating about the galaxy.

Star Empire's graphics are some of the best I've seen in a space simulation. As you jet about the universe, the stars scroll smoothly past your ship. Enter a planet's atmosphere and the scene changes to a first-person point of view, where you must successfully navigate a corridor to get to the planet's surface. You see haunting images of the stark, floating rectangles that make up the corridors. Once on the planet, you find yourself navigating forests, dodging and blasting enemy missiles, and collecting pods for trade.

While I commend the programmers of Star Empire for their efforts in avoiding the label of "sequel vultures," I wish that the publishers had paid more attention to detail. The software's documentation is just 12 skimpy pages—the worst I've seen in several years. Misspellings and typos abound throughout. The only diagrams included are found on a cardboard insert—truly inadequate considering the multiple screens that can be presented at any one time. And, although the keyboard commands needed to find your way around Star Empire are relatively few, a separate keyboard command card would've been a nice touch.

Checking your Galaxy Map will help you travel through Star Empire.

These criticisms aside, Star Empire possesses the merit to carve its own niche into software history. Its universe is immense and filled with complexities that will lure you back to the keyboard for hundreds of hours. I can hardly wait to see the sure-to-come Star Empire imitations. Somehow, I don't think I'll be as accommodating. *(First Row Software, 900 East 8th Ave., Suite 300, King of Prussia, PA 19406. C-64/$24.95.)*

—JOHN RYAN
BILOXI, MS

MAE, VERSION 5.1 ..... B

A Blast From the Past

MAE, a macro assembler and editor for the C-64, is one of the oldest assemblers around. It's a full-featured assembler development package that includes a DOS wedge, the Micromon machine language monitor, a relocating loader and a simple word processor.

MAE's greatest strength is probably its intelligent use of memory on the C-64. The editor, assembler, monitor, DOS wedge and ML source can all be resident in memory at the same time. Amazingly, MAE still manages to leave free the popular 4K block of RAM beginning at $C000. MAE is even compatible with Basic, allowing you to write, assemble and debug ML subroutines called from Basic programs without having to constantly load and reload different functions from disk!

The DOS wedge provides easy access to most disk functions. It's an enhanced version of the public-domain CBM wedge, with extra commands added to make it simpler to use.

The editor looks very similar to the standard Basic line editor, with extensions for auto line numbering, renumbering, block copy and delete, and string search and replace. You can access DOS or invoke the assembler from the editor. If you're willing to give up 1K of memory, you can even install a supplied scrolling program that lets you easily move back and forth, using the cursor keys, through the source code. Some of the Direct mode commands, however, are a little quirky and attest to the package's lineage.

Another goody is the word processor. With it, you can type in, modify and save documents using the MAE text editor. Although it can't compete with fancier, full-screen word processors, it does provide word wrap on output, margin control, justification, spacing, headers and footers. . .and, it's free!

The assembler does everything a professional Commodore assembler should—it supports macros that can be nested up to 32 levels. The conditional assembly feature lets you selectively assemble or skip parts of the source code based on the value of a variable or address. The optional interactive feature prompts for input during the first pass of the assembly, providing the capability of specifying the origin address at assembly time, or for specifying a value that will direct a particular conditional assembly path.

The only complaints I have with this package are minor. Assembler directives are two characters long and many are different from those commonly used by other assemblers. Fortunately, the manual contains a handy translation table. The Addressing mode con-

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ventions are a little unusual too, but not hard to learn. Both of these problems are the result of MAE's longevity; they appear to stem from design decisions made before conventions had evolved for Commodore assemblers.

Another minor gripe is the cryptic, two-character error codes that have to be referenced in the manual. Once again, it's fortunate that there's a summary of error messages on the inside back cover.

Speaking of the manual, the documentation is first rate. It's spiral bound, easy to read, and contains numerous documented examples and hands-on demos, with hints on how to make the most of this very powerful development package.

In addition to all the powerful features described in this review, MAE is still being revised. A future version of the software promises full support for the C-128, faster assemblies and an optional 80-column, bit-mapped text screen for C-64 users.

If you're looking for a good, inexpensive assembler development system, consider MAE. *(Schnedler Systems, 25 Eastwood Road, PO Box 5964, Asheville, NC 28813. C-64/$29.95.)*

—MICHAEL BROUSSARD
HERNDON, VA

4×4 OFF-ROAD RACING ..... C+

Vroooom!

And They're Off:

Off the Road, That Is!

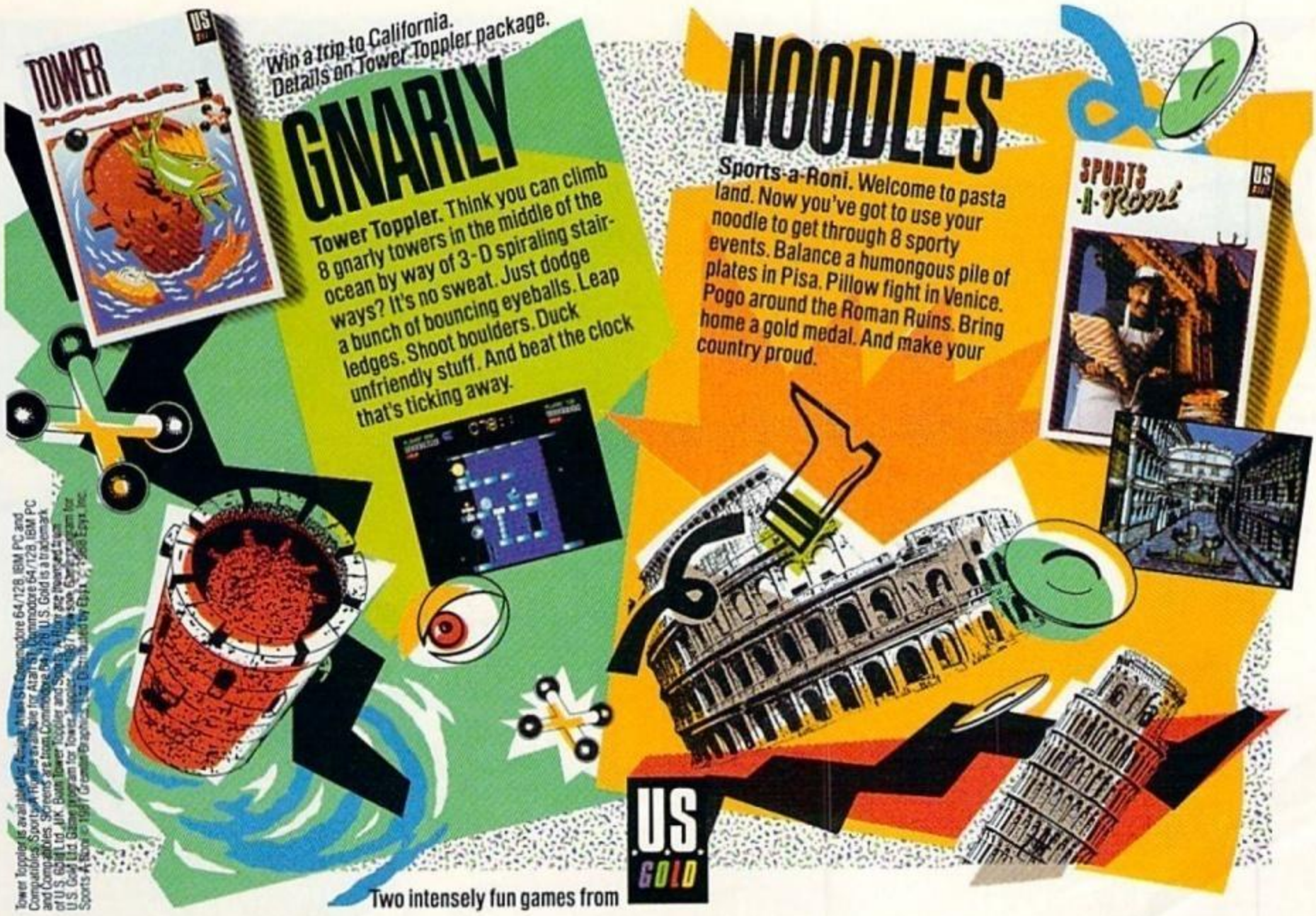
I hate to see a good idea go to waste, which is probably the reason I'm disappointed with 4×4 Off-Road Racing. This driving simulation could have stood out from the road-racing pack because it's based on a slightly different approach.

The premise behind Epyx's program is that you are an off-road racer *preparing* for a big event. Before you hit the highway, you must decide what type of vehicle you want to compete in and how to equip it. You can also elect where you want to race—over the rough and rugged Baja terrain, the treacherous desert of Death Valley, the slimey mud of Georgia or the snow and ice of Michigan.

Each of the four vehicles is rated in seven categories: power, endurance, gas mileage, ease of repair, weight, payload and fuel capacity. You can equip your vehicle with spare parts and options, taking on everything from a mechanic to a beverage. The catch is that each item adds weight to your vehicle, depletes your money supply and takes up space in your rig.

The road is where this program begins to fall apart. For starters, vehicle operation is overly simplistic. All you can really do is steer left or right and accelerate.

Unfortunately for gamers who enjoy more control, shifting is done automatically by the computer. And although you can slow down gradually or slam on the brakes, there's rarely ►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a need to do either, for the graphics and animation during the driving sequences are mediocre. For one thing, the road layouts are basically the same. Although the courses are supposed to cover different terrain and do *look* different, I never really get any sensation of driving in different conditions. The vehicle behaves pretty much the same, whether it's traversing the Michigan snow or Death Valley's desert floor.

Some of the obstacles vary cosmetically from course to course, but they have the same effect on a vehicle that runs into them. Even the background scenery is somewhat disappointing and certainly not up to Epyx's usual high standards.

The animation is also less than sparkling. With the monitor providing a perspective from behind and slightly above your vehicle, it looks as if the road—rather than the vehicle—is moving.

The sensation of movement isn't bad. Objects grow larger smoothly and gradually, although the backgrounds remain rather static. What's really disturbing is that other vehicles occasionally appear on the screen and "bump" your truck even though the two vehicles are visually not making contact.

I'm sorry the animation and graphics aren't better, because there are other play elements that are quite appealing. During the course of a race, you'll have to make repairs, perform routine maintenance and keep your vehicle gassed up. Pit stops can take place at checkpoints or, if a vehicle is disabled, during the middle of a run.

Elements like those are nice touches and not often found in driving simulations. Few other programs of its kind have the depth of 4x4 Off-Road Racing, which could have been the thinking man's racing software. Unfortunately, most fans of this genre will probably think the graphics and animation fail to measure up to the program's other features. *(Epyx, 600 Galveston Drive, Redwood City, CA 94063. C-64/$39.95.)*

—SCOTT WASSER
WILKES-BARRE, PA

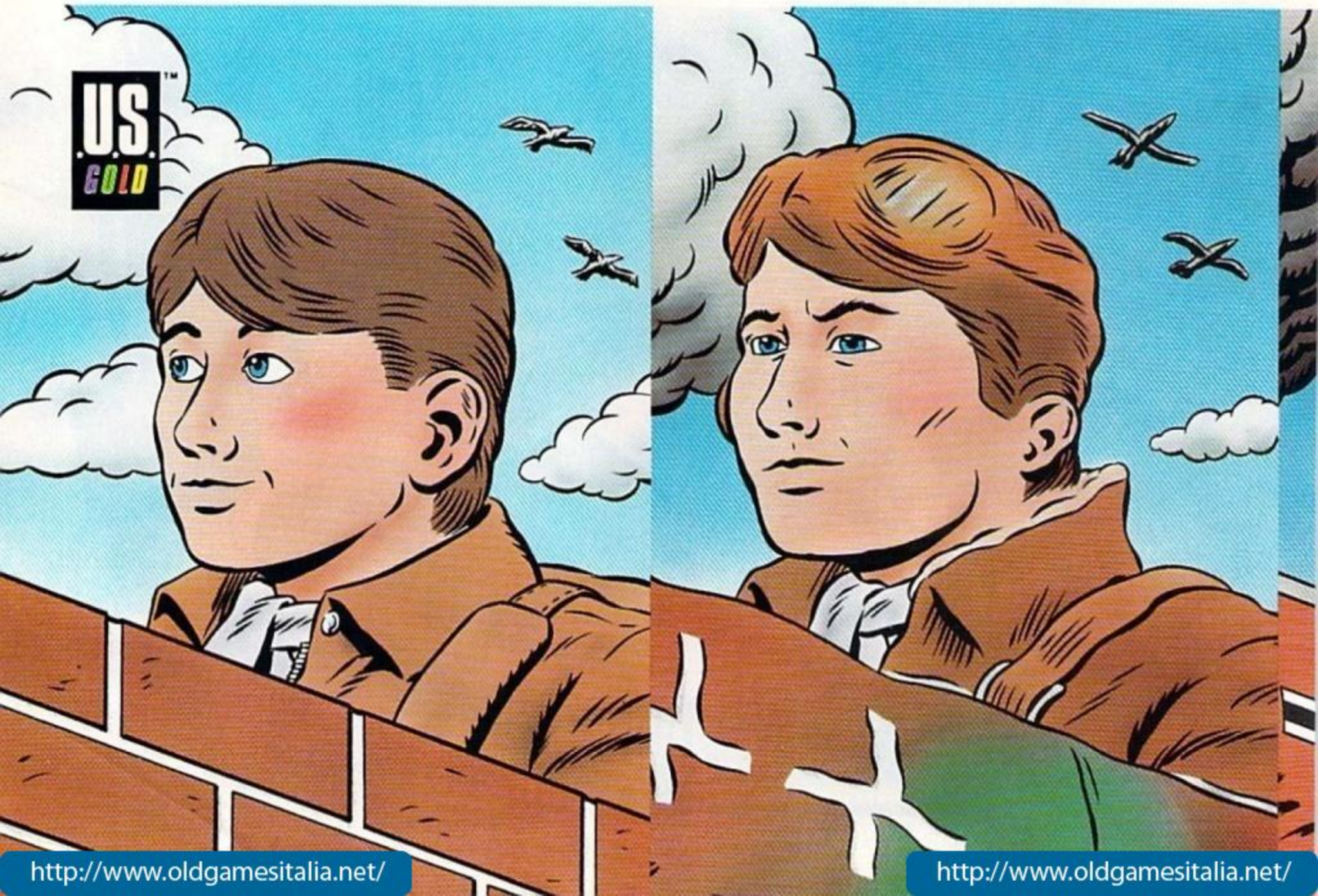
THE SHADOWS OF MORDOR ..... E

Don't Give Up Your Book-of-the-Month Club Membership

The Shadows of Mordor is based on Book IV of *The Two Towers* by J. R. R. Tolkien. For those familiar with Middle Earth, the adventure begins at the edge of Nen Hithoel Lake. Frodo and Sam have left their companions and secretly set off by themselves to continue the quest to destroy the One Ring.

It's hard to imagine anyone who has read Tolkien failing to become enchanted by the lives of the Hobbits and the other characters that inhabit Middle Earth. Unfortunately, I feel I must urge those who love *The Lord of the Rings* to stick with reading and avoid this text adventure version.

The Shadows of Mordor is somewhat improved over Addison-Wesley's pre-



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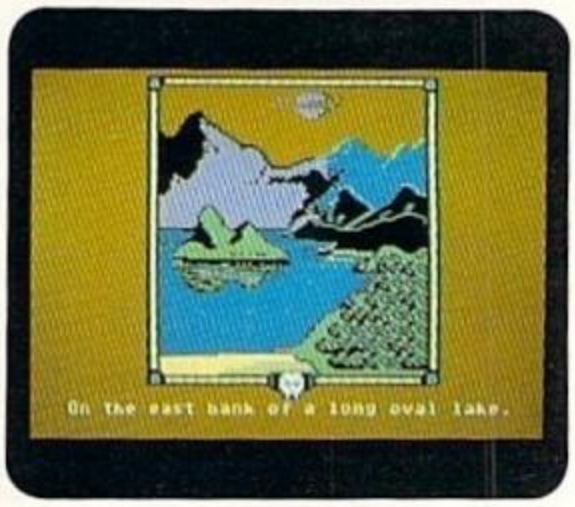
vious two releases, but not enough. When you're communicating with another character, it's now possible to type multiple commands instead of having to painstakingly lead a character through various actions step by step. That sounds great, but you must still do a great deal of experimenting before you hit on the correct phrase.

Although the documentation boasts that the game recognizes over 800 action words, I found myself spending a lot of time staring at the screen, trying to think of synonyms to get something going. What's really infuriating is the fact that there are times when you receive no acknowledgement that a command hasn't been recognized.

New in this game is the ability to play either Frodo or Sam. However, if you want to be able to switch characters, you must instruct the program accordingly at the beginning. Otherwise, you are stuck with one character throughout the game.

A minor irritation is the fact that many actions are echoed in the command line. For instance, if you speak to a character, the command line shows "Frodo speaks to Sam." Also, for some strange reason, the authors decided that if you give an object to another character, he'll usually refuse to give it back.



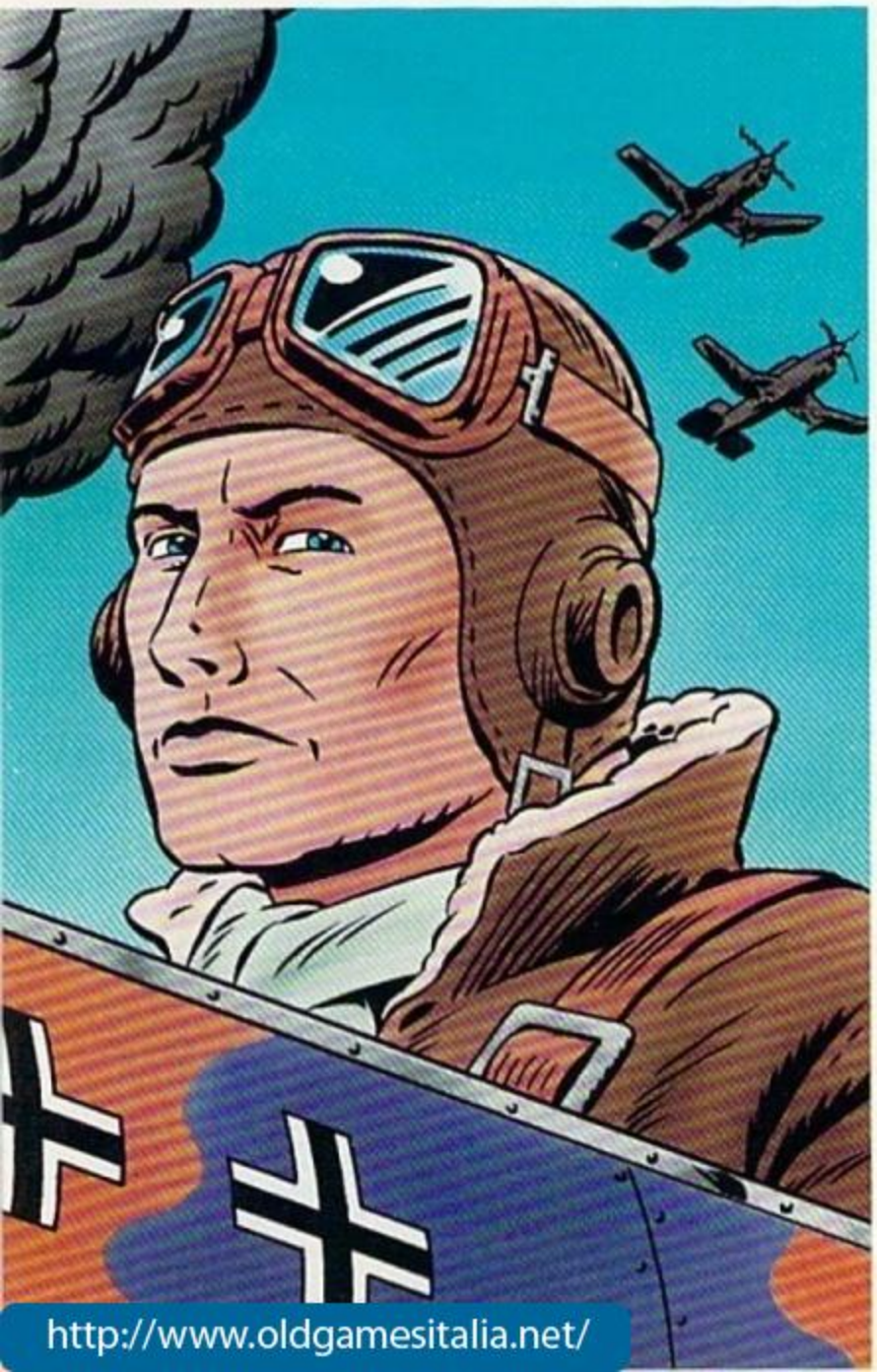
Medium-resolution graphics in The Shadows of Mordor.

The medium-resolution pictures are nice, but really don't compare to the mental pictures that are conjured up by Tolkien's brilliant prose. Gameplay is slowed down considerably as the on-screen graphics load, and there's no way to shut them off. For example, if you make the mistake of typing "Look" to get another look at the room you're in, you'll have to wait once again while the picture reloads.

I encountered several places where the game responded with a completely inappropriate answer when I typed in a command. "Put the ring in Frodo's pocket" resulted in the response, "There is no barrel here!"

Experienced adventurers will quickly grow frustrated with the slowness and awkwardness of this game. Beginning adventurers may well get the wrong impression about text adventures and become too discouraged to try others. I can't recommend The Shadows of Mordor even for the most addicted adventurer. *(Addison-Wesley Publishing Co., Route 128, Reading, MA 01867. C-64/ $29.95.)*

—ART LEWIS KIMBALL
TUSCOLA, IL ■



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Meet a shining star in today's interface market and a hardened stalwart of huge memory capacity.

Compiled by BETH S. JALA

SUPER GRAPHIX GOLD ..... A–

For Extra Memory, Extra Fonts and Extra Ability— Check Out This Interface

Curses! After all these years of service, my printer interface turned 10 microchips up—dead as a Plus/4.

R.I.P., one Cardco ?/+ interface. The epithet reads: "It did what it was supposed to do—convert Pet ASCII into true ASCII so that a Gemini 10X, and later a Star NX-10, could digest characters."

What's a computer user to do for a replacement? Today's interfaces have more features and bigger memories than they did a year or two ago. And one of the best on the market right now is Xetec's Super Graphix Gold.

It carries a hefty price, but it also packs a hefty punch. For $119.95, you get a 32K buffer, 32 printer choices, four built-in fonts and room to download four user fonts, 21 secondary addresses, 12 printing channels, two built-in screen dumps, a banner channel that prints fonts and custom-font ability.

Super Graphix Gold comes in a steel case so sturdy that you couldn't swing it around your computer room without doing serious damage to the furniture. Two buttons peek out through holes in the front plate: one resets the interface, the other clears the buffer area. An LED on top of SGG lets you know when it's sending or receiving information, or when an error has occurred.

The interface also has two rows of DIP switches that have eight switches each. One row deals with the printer. You can select anything from an Epson to a Seikosha, pick device number 4 or 5 and set the printer width to 80 or 132 columns. The second set of DIP switches controls print conversion and typefaces.

Power for SGG comes from a transformer plugged into a wall socket. For those handy in soldering, Xetec thoughtfully provided instructions for making a minor alteration to the circuit board to allow the interface to draw power from pin 18 of the printer, provided it supplies 5 volts. The manual warns, however, that such a modification voids the interface's lifetime warranty.

Super Graphix Gold communicates directly with the disk drive. In addition to supporting the 1541, it recognizes if a 1571 is present and sends information in the Fast Communication mode.

Like interfaces, dot matrix printers have undergone an evolution in the past few years. Most have the ability to print near-letter-quality text. Some even have several typefaces available. But none have the variety of typefaces that are supplied with Super Graphix Gold.

Four fonts are contained in the interface's memory: Near-Letter Quality; Helvetica, a clean, round typeface; Broadway, an art deco style; and Script.

Another 27 fonts, nine of which are superfonts, are on the disk supplied with the interface. The printer makes two passes for each letter, printing each in a dot density double that of normal printing. The result is a smooth, crisp, well-formed letter. The disk also has a Create program in case none of the fonts please you, or if you want to alter certain letters or numbers in the font.

Once loaded into the interface, the fonts can be enhanced using bold, underline, italic, expanded, compressed, double height, four pitches (ten through 13 characters per inch), superscript and subscript. Fonts can also be used in the banner channel, which turns them sideways and prints them eight inches high. All the special effects mentioned above are available in this format. You'll find PrintMaster and Print Shop offer more versatility, but at least the Banner mode for Super Graphix Gold is convenient.

Handy too, is the ability to print out a text file without having to load a utility program. Simply opening a command channel to interface and typing in the instructions does the trick.

Super Graphix Gold is as good at handling graphics as it is at handling text. It likes the 32 block graphics supported by drawing programs, and it can hold them in its memory until commanded to print them. Or, using a utility program, you can print graphics out in various sizes and densities.

I do have some criticisms of the Gold package: The instruction manual, although detailed, should offer more specific examples. In the case of text printing, the manual isn't just ambiguous, it's misleading. While it says you can print out a document file by typing PRINT#1,"DT:filename",8, it won't print out if it's a sequential file. To do that, you must add ",s" to the filename.

Another undocumented bother: If the interface is connected, but the printer isn't turned on, programs won't load. Solution: Turn on the printer or pull the interface plug from the drive. It's an obvious solution, once it dawns on you what's causing the problem.

If you're looking for a good program to simply improve the looks of your typefaces, then check out Xetec's Fontmaster II or Fontmaster 128. Both are excellent software remedies for dull-looking dot matrix print.

If you're planning to buy your first interface, Super Graphix Gold is a lot for a first-time user to bite off. Consider one of Xetec's less awesome interfaces if you're just coming online.

However, if you know what to do when the printer starts spewing out graphics characters and capital letters, and if you understand escape codes and know how to read an error channel, then Super Graphix Gold should prove manageable. A smattering of interface

A sampling of the fonts available with Super Graphix Gold.

This is the Xetec Super Graphix Gold
This is the Xetec Super Graphix Gold
This is the Xetec Super Graphix Gold
This is the Xetec Super Graphix Gold

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knowledge will get you started.

A manufacturer's own comments about a product are sometimes inflated or unfounded. Xetec offers this comment on the front of its manual for the Super Graphix Gold: "The Ultimate Printer Interface for Commodore Computers." Well put. *(Xetec, Inc., 2804 Arnold Rd., Salina, KS 67401. $119.95.)*

—LONNIE BROWN
LAKELAND, FL

LT. KERNAL ..... C+

Looking for CP/M Support, Speed and Large Capacity? Look to a Hard Drive

A hard disk drive for the Commodore computer may be the most frequently wished-for accessory in the history of home computing. Millions of C-64 and C-128 owners have spent countless hours waiting for programs to load from their pokey 1541 drives. Thousands of users who compute for business reasons moved on to more expensive machines simply because of the limited speed and capacity of their CBM drives.

The Lt. Kernal, a 20-megabyte hard drive, rewards those Commodore enthusiasts who've remained true to the CBM faith with the opportunity to enter personal computing's major leagues. Capable of storing as much information as 128 single-sided floppy disks, the Lt. Kernal offers almost instantaneous program loads and the ability to work with database files of almost any length.

The Lt. Kernal is a two-piece system. The main unit is a sturdy metal case about the same size as two 1541 drives standing side by side. It contains a standard Seagate model 225 hard drive, the circuit board from a conventional PC power supply and a cooling fan. The host adapter, a 4½-by-5-inch unit with the circuitry that lets your 64 or 128 communicate with the hard drive, plugs into the expansion port.

Installation requires opening your computer's case and attaching insulated clip leads to a few chips. C-128 and C-128D owners must also pry out the 8722 (memory management unit) chip and insert a small circuit board. The instructions are excellent and this entire procedure takes less than half an hour.

If you've done everything correctly, the next time you boot up your computer you should see a start-up screen announcing the Lt. Kernal's presence and a status line with a lot of unfamiliar information. Unfortunately, just when things should be getting easy, they suddenly turn tough. After carefully holding your hand throughout the installation process, the instruction manual abandons you. There is no tutorial to help you harness this swift racehorse.

I consider myself a very experienced Commodore user, yet I spent several frustrating hours paging through command overviews and DOS feature explanations before I even got a hint of how to transfer some of my existing files to one of the 11 directories (each with 16 sub-directories).

When I did finally get it, my frustration gave way to awe. With the Lt. Kernal, you can run a program just by entering its filename. Programs are up and running in less time than it nor- ►

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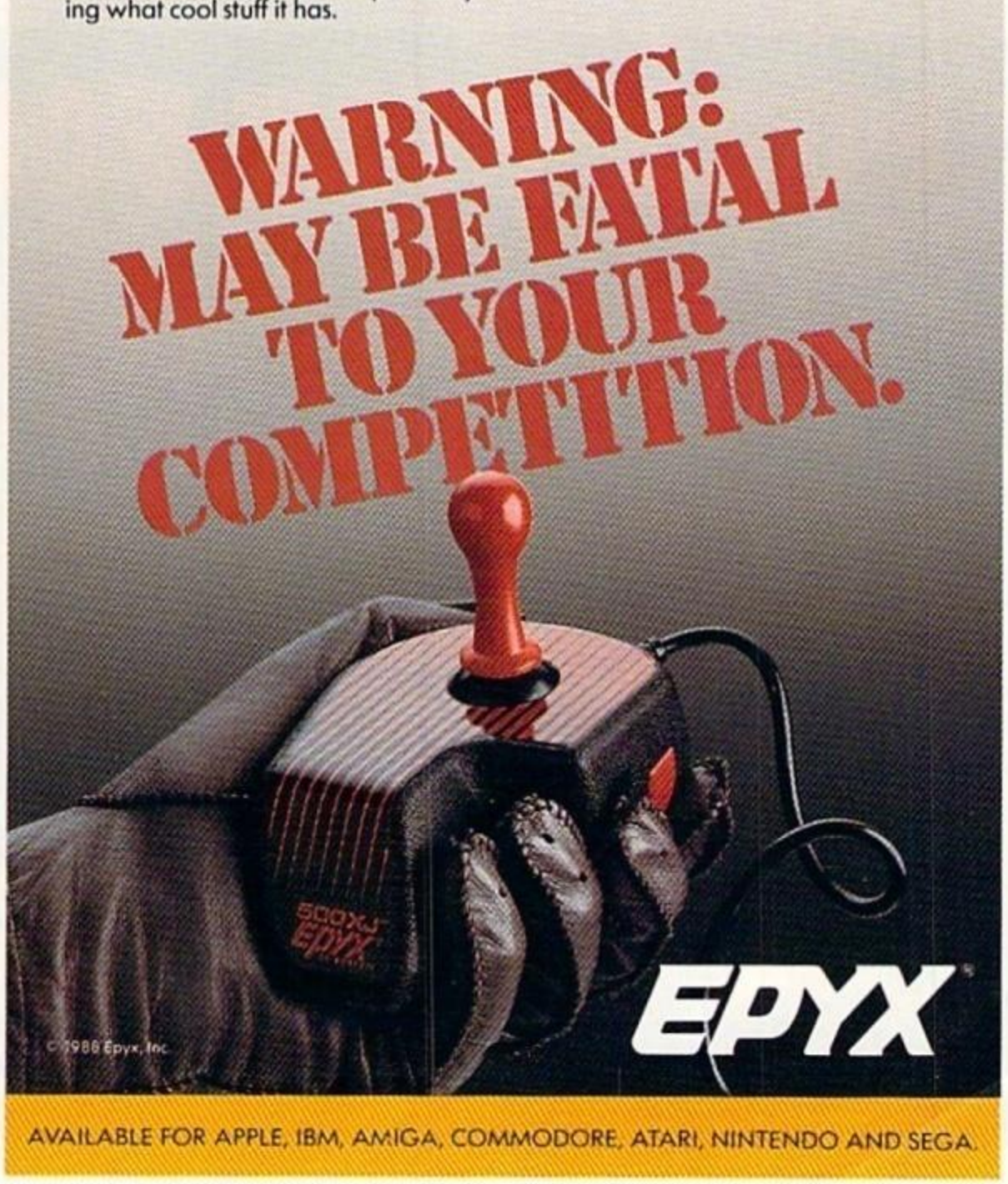

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mally takes to enter the individual Load and Run commands. Unfortunately, my astonishment was rather short-lived. The Lt. Kernal turns out to be an addition to, not a replacement for, your existing drive(s).

Many vendors of commercial software persist in publishing programs on copy-protected disks. Since you must copy a program from its original floppy to the Lt. Kernal's hard disk, many commercial programs won't survive the transfer. Utilities that create "archival" backups of your software won't help here.

Anticipating this problem, the folks at Xetec attempted to provide a solution. ICQUB is a snapshot capture utility that's activated by pressing a button atop the Xetec host adapter. After loading a protected program from its original disk, ICQUB freezes the contents of your 64's memory and creates a bootable file that should let you run the program from the hard drive. Successful use of this utility requires some experimentation. My attempts to use ICQUB on some games were unsuccessful.

The Lt. Kernal was otherwise quite impressive. In 128 mode, however, the operating system showed a remarkable reluctance to read directories from floppy disks in either of my 1571 drives. Attempts to use Basic's Load"$" and List commands were alsc unsuccessful. This could be due to the early version ROM in my C-128, but I'm not worried about it. I'm still trying to figure out what to do about the corrupted "systemindex" header that makes it impossible to read or validate the sub-directory where I stashed my C-64 files.

Although its cost per byte ratio is among the lowest of available hard drives, the Lt. Kernal is still an expensive peripheral. Nonetheless, I'm sure it's attractive to SYSOPs who want to support a large library of files for a BBS, programmers who spend too much time waiting for code to be compiled and business users with address lists or other kinds of data files that are too large for floppies. The Lt. Kernal's ability to function in CP/M mode could also make the C-128 a serious player in the ever-shrinking world of CP/M hardware.

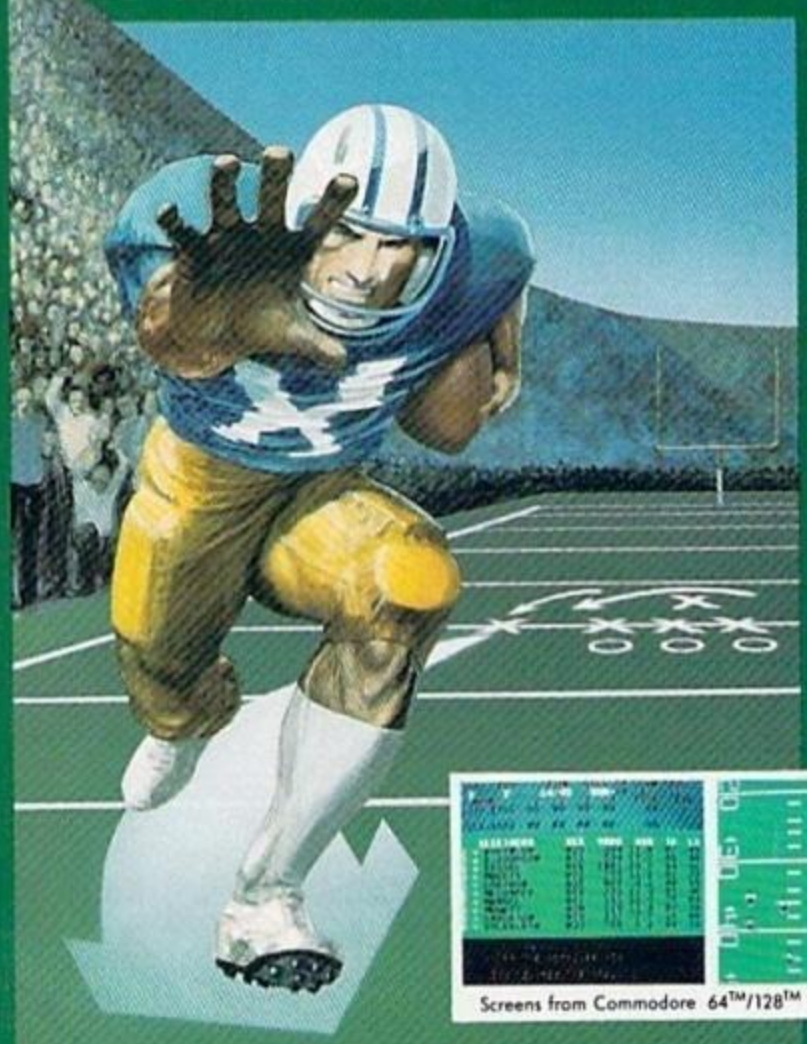
Unfortunately, I can't recommend its use by either the average home user or the business operator. Even at half the price, the question of whether the convenience of a hard disk could overcome the intimidating and quirksome nature of the Lt. Kernal's complicated operating system remains unanswered.

Of equal concern is the lack of adequate utility software to maintain thousands of files spread over up to 176 subdirectories and to back up the contents of the hard drive to floppy disks. The golden rule of hard disk users everywhere is *back up your data*.

With the C-64 maintaining its amazing popularity primarily as a home applications and game machine and the cost of the Lt. Kernal equal to that of a discount PC with the same hard drive built in, this peripheral may be a great idea whose time has passed. *(Xetec, 2804 Arnold Rd., Salina, KS 67401. $899.95.)*

—JOHN PREMACK
LEXINGTON, MA ■

PURE·STAT FOOTBALL



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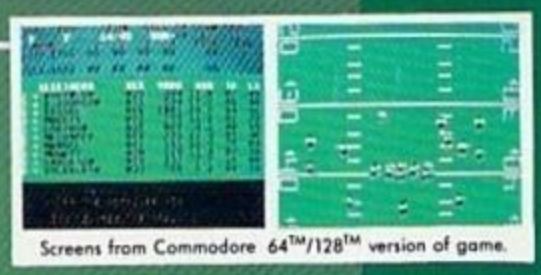

Screens from Commodore 64™/128™ version of game.

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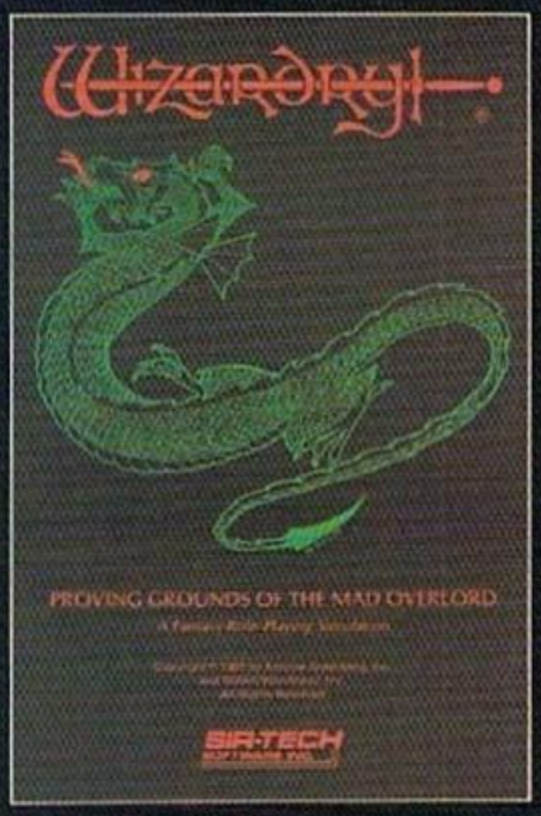
Wizardry®



Now the world of Wizardry comes to Commodore 64/128

PROVING GROUNDS of the MAD OVERLORD

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Apple II Series,
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With your Commodore 64 or 128 you can now experience an exciting initiation into the internationally-acclaimed world of the Wizardry Gaming System.

Begin with the first scenario*: Proving Grounds of the Mad Overlord. It challenges you to overcome devious tricks and sudden traps, strange and mysterious encounters, maze upon maze of puzzles, stimulating and intricate sub-plots and sophisticated themes. Ingenious multi-level, mind-bending tests abound with vile creatures, unspeakable villains, courageous adventurers and strong allies to hinder and help you achieve ultimate victory.

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PLAY IT TO THE HILT!

* Many other Wizardry sce

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Who's Number One?

The votes are in, the results have been tabulated, and the software winners of RUN*'s Reader Choice Awards are. . .*

EVERY USER HAS AN OPINION when it comes to what works best on the Commodore. So when we asked *RUN* readers to choose their favorite programs, we were prepared for a wide range of responses vigorously defending their selections.

The results of the balloting reflect this. Votes were widely distributed among products and manufacturers as readers used an eclectic approach in stamping their seal of approval on their favorite software.

In our June and July issues, we put together a ballot of software choices and asked readers to vote for their favorite entries in each of 19 different categories. Readers considered 163 software selections that included long-time favorites, as well as recent releases.

Voter response in a particular category indicates some experience with that application, and readers showed familiarity with a surprisingly wide range of software. Each category, ranging from games to productivity to utilities, drew a healthy percentage of response—at least 70 percent.

Heavily into Games

Since 1988 will most likely be remembered as the year of the games in the Commodore market, entertainment software was a popular division, with seven different categories to accommodate the varied types of programs. The results of the poll show that a few companies gambled on innovation in maximizing the sound and graphics capabilities of the Commodore. . .and won. For the most part, companies are developing software for the basic, out-of-the-box C-64. With very few exceptions, game companies have yet to take advantage of the RAM expander or 1581. . .or the 80-column capabilities of the C-128.

This was also the year that many manufacturers translated much of their software to other systems, but by no means did they abandon the Commodore market. In 1988 we witnessed the entrance of video game manufacturers into the marketplace, while the established Commodore heavyweights tried to retain their top position against this onslaught. Video games, however, were not included in this year's ballot, which was prepared before the coin-ops made the Commodore scene.

Despite the emphasis on games, *RUN* readers are still very involved with productivity applications. Word processing and desktop publishing, two of the most popular productive uses for the Commodore computers, garnered the most attention among our voters. Also, database and spreadsheet software placed in the top five in the voting.

For the purposes of this tally, *RUN* tabulated just under 800 votes.

Top Vote-Getters

The voting was dominated by the newer software offerings, but several long-time favorites, such as Beach Head (arcade games), Flight Simulator II (simulations) and The Print Shop (desktop/tabletop publishing), copped high honors in their respective categories.

Due to deadline pressures, some readers' favorites may have been excluded from the ballot, but we provided readers with a chance to write in their choices. The only write-ins to receive significant recognition were Word Writer 128 in the word processing category and the Partner 128 utility program.

Perhaps the most clear-cut winner among our readers was GEOS, which topped its nearest competitor by almost 40 ►

ILLUSTRATED BY CATHERINE KANNER

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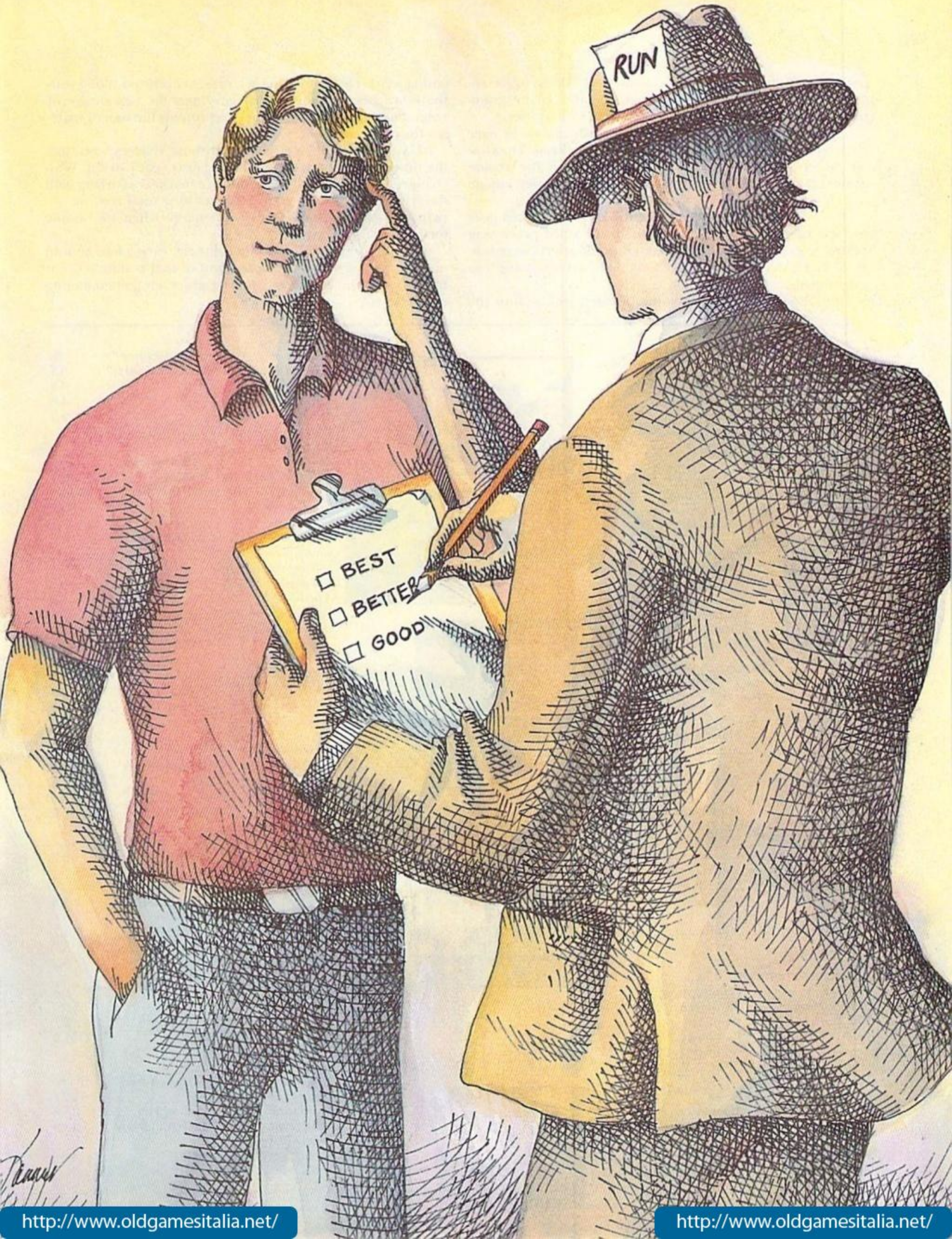

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points in the integrated software category. Three other applications for GEOS—geoCalc, geoFile and geoProgrammer—were also winners in their respective categories.

Carmen Sandiego was another lop-sided winner—by over 20 percentage points—among education programs. The closest race involved Beach Head and Archon in the arcade games category, which Beach Head won by .2 of a percentage point.

Our "familiar name, but different publisher" award goes to PaperClip III, a runaway winner in the word processing category. Yuppie sports were in, traditional sports were out, as *RUN* readers named Epyx's California Games the top sports game.

The following tables give you a detailed look at how the voting went. The winner in each category is listed, along with the other products in the category and the percentage of votes that each received. "Other" represents the sum of write-ins for each category.

RUN extends appreciation to all those readers who took the time to vote. Be sure to look for next year's ballot. With changes and advances in the software market occurring with the frequency of campaign promises at a state fair, we anticipate that some new faces will emerge when we sample our readership next year.

And we also congratulate the winners. First place should not be construed as an endorsement of that product, but is indicative of the confidence that product has gained among our readers.

Entertainment

Arcade Adventures

Product	Manufacturer	%
Defender of the Crown	***Cinemaware***	***15.5***
Airborne Ranger	MicroProse	14.0
Pirates!	MicroProse	13.1
The Last Ninja	Mediagenic	9.5
The Three Stooges	Cinemaware	9.0
Elite	Rainbird	8.9
Infiltrator series	Mindscape	5.0
The Movie Monster Game	Datasoft	4.2
The Train	Accolade	4.0
Moebius	Origin	3.5
Alternate Reality series	Datasoft	3.4
Cauldron	Broderbund	3.2
Robot Rascals	Electronic Arts	3.1
Frankie Goes to Hollywood	Rainbird	0.6
Other		2.9

Arcade Games

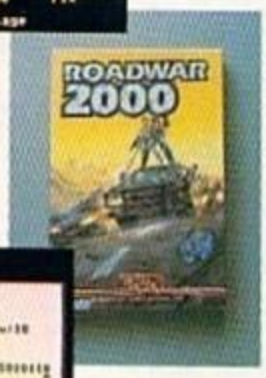
Product	Manufacturer	%
Beach Head	***Access***	***14.8***
Archon	Electronic Arts	14.6
Marble Madness	Electronic Arts	14.2
Into the Eagle's Nest	Mindscape	9.8
Skyfox II	Electronic Arts	9.4
GeeBee Air Rally	Mediagenic	9.1
Boulder Dash series	Electronic Arts	6.3
Dan Dare	Electronic Arts	5.1
Delta Patrol	Electronic Arts	4.6
Rad Warrior	Epyx	3.2
Fairlight	Mindscape	2.0
Other		6.9

Graphics Adventures

Product	Manufacturer	%
Maniac Mansion	***Mediagenic***	***34.1***
The Pawn	Rainbird	24.8
Guild of Thieves	Rainbird	20.3
Accolade's Comics	Accolade	18.6
Other		2.2

Role-Playing Adventures

Product	Manufacturer	%
Bard's Tale series	***Electronic Arts***	***34.1***
Ultima series	Origin	16.3
Beyond Zork	Infocom	14.8
Alter Ego	Mediagenic	9.3
Mind Mirror	Electronic Arts	8.5
Phantasie series	SSI	7.8
Wizard's Crown	SSI	4.8
Other		4.3



Simulations

Product	Manufacturer	%
Flight Simulator II	***SubLogic***	***17.3***
Gunship	MicroProse	14.0
Test Drive	Accolade	10.2
Echelon	Access	9.7
Silent Service	MicroProse	9.6
Chuck Yeager's Advanced Flight Trainer	Electronic Arts	9.3
Apollo 18	Accolade	6.8
Up Periscope!	ActionSoft	5.6
Project: Stealth Fighter	MicroProse	4.9
Jet	SubLogic	3.2
Stealth Mission	SubLogic	2.8
Super Huey II	Cosmi	1.8
Thunderchopper	ActionSoft	1.5
Other		3.2

Sports Games

Product	Manufacturer	%
California Games	***Epyx***	***21.8***
LeaderBoard series	Access	17.4
Hardball!	Accolade	12.0
Superstar Ice Hockey	Mindscape	11.4
4th & Inches	Accolade	6.2
MicroLeague Baseball	MicroLeague Sports Association	5.3
Pure-Stat Baseball	Software Simulations	4.7
Indoor Sports	Mindscape	3.7
10th Frame	Access	3.5
Football	Software Simulations	3.3
Championship Baseball	Mediagenic	2.7
Other		7.9

Strategy Games

Product	Manufacturer	%
Roadwar 2000	***SSI***	***22.1***
Gulf Strike	Avalon Hill	15.5
Battlefront	Electronic Arts	13.9
Rebel Charge at Chickamauga	SSI	12.1

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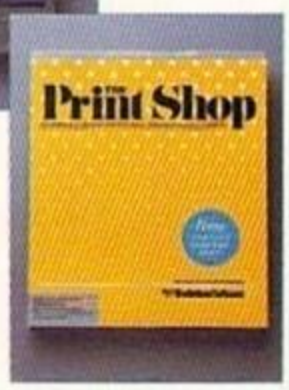
Product	Manufacturer	%
The Sentry	Rainbird	12.1
President Elect	SSI	8.2
Tracker	Rainbird	6.5
Other		9.7

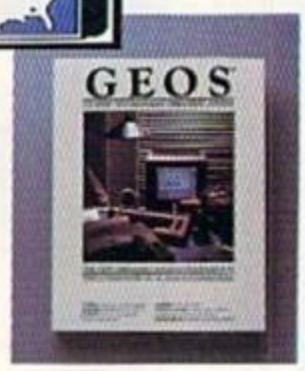
TEXT ADVENTURES

Product	Manufacturer	%
Hitchhiker's Guide to the Galaxy	*Infocom*	*26.0*
Zork Trilogy	Infocom	21.6
Leather Goddesses of Phobos	Infocom	12.3
Nord and Bert Couldn't Make Head or Tail of It	Infocom	7.8
Bureaucracy	Infocom	7.0
Hollywood Hijinx	Infocom	5.8
Wishbringer	Infocom	4.7
Seastalker	Infocom	4.5
Plundered Hearts	Infocom	2.9
A Mind Forever Voyaging	Infocom	2.8
Other		4.5



EDUCATION

Product	Manufacturer	%
Carmen Sandiego series	*Broderbund*	*31.5*
Typing Tutor IV	Simon & Schuster	10.2
Cave of the Word Wizard	Timeworks	8.6
Bank Street School Filer & Databases	Sunburst	8.1
Chem Lab	Simon & Schuster	7.6
The Perfect College/Score	Mindscape	6.4
Stickybear series	Weekly Reader	5.9
Talking Teacher	Rainbird	4.5
Speed Reader series	Davidson	3.5
MacBeth	Avalon Hill	3.0
Success with Math series	CBS	3.0
Ladders to Learning	McGraw-Hill	2.1
The Accelerated Reader	Readup	1.3
Teddy Bear.rels of Fun	DLM	1.0
Whole Brain Spelling	SubLogic	0.8
Other		2.7



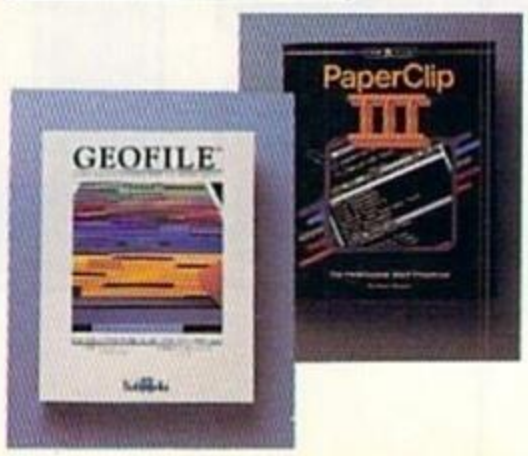
PRODUCTIVITY

TELECOMMUNICATIONS

Product	Manufacturer	%
Bobsterm Pro	*Progressive Peripherals*	*39.8*
Speedterm	Abacus	33.3
Prototerm	Briwall	17.5
Other		9.4

DATABASES

Product	Manufacturer	%
geoFile	*Berkeley Softworks*	*28.6*



Product	Manufacturer	%
Data Manager	Timeworks	24.1
Superbase	Progressive Peripherals	17.5
Pocket Filer 2	Digital Solutions	13.0
Fleet Filer	PSI	9.0
Filer's Choice	Mediagenic	2.9
Other		4.8

DESKTOP/TABLETOP PUBLISHING

Product	Manufacturer	%
The Print Shop	*Broderbund*	*25.6*
geoPublish	Berkeley Softworks	22.0
PrintMaster	Unison World	12.0
PaperClip Publisher	Electronic Arts	10.5
Newsroom	Springboard	10.4
Outrageous Pages	Electronic Arts	5.9
Hi-Tech Expressions series	Hi-Tech Expressions	3.7
Personal Newsletter	Softsync	3.7
Create with Garfield	DLM	2.8
Color Mail	Hallmark	2.6
Other		0.8

GRAPHICS (DRAWING)

Product	Manufacturer	%
CAD 3-D	*IHT*	*26.6*
Doodle!	City Software	19.0
CAD PAK 128	Abacus	13.8
The Advanced OCP Art Studio	Rainbird	13.2
KoalaPainter	Koala	8.3
Flexidraw	Inkwell	7.3
Home Designer 128	Briwall	4.8
Color Me	Mindscape	1.2
Other		5.7

INTEGRATED SOFTWARE

Product	Manufacturer	%
GEOS	*Berkeley Softworks*	*57.6*
Pocket series	Digital Solutions	17.7
Fleet System	PSI	10.2
Vizastar 128/ Vizawrite 128	Progressive Peripherals	7.5
Personal Choice series	Mediagenic	5.5
Other		1.5

SPREADSHEETS

Product	Manufacturer	%
geoCalc	*Berkeley Softworks*	*29.3*
Swiftcalc	Timeworks	23.2
Multiplan	Epyx	16.3
Pocket Planner 2	Digital Solutions	14.8
Vizastar 128	Progressive Peripherals	7.7
Planner's Choice	Mediagenic	4.5
Other		4.2

WORD PROCESSING

Product	Manufacturer	%
PaperClip III	*Electronic Arts*	*21.0*
geoWrite Workshop 128	Berkeley Softworks	15.1
Pocket Writer 2	Digital Solutions	10.6
Fleet System IV	PSI	9.5
Superscript 128	Progressive Peripherals	9.0 ►

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Product	Manufacturer	%
The Write Stuff	Busy Bee	7.3
Wordwriter 128	Timeworks	7.0
Writer's Choice	Mediagenic	3.7
Vizawrite 128	Progressive Peripherals	3.6
FontMaster 128	Xetec	3.2
Other		9.5

UTILITY

MULTIFUNCTION ADD-ONS

Product	Manufacturer	%
FastLoad Cartridge	***Epyx***	***29.2***
Mach 5/Mach 128	Access	13.2
Final Cartridge series	H&P Computers	13.0
Super Snapshot	Software Support International	9.3
Warp Speed	Cinemaware	7.0
Partner 64	Timeworks	6.8
Quick Brown Box	Brown Boxes	5.0
Partner 128	Timeworks	3.1
RapiDOS	Chip Level Designs	3.3
Blowup	DSI	2.8
JiffyDOS/64	Creative Micro Designs	2.5
Quackdas	CDA	1.7
Other		3.1

PROGRAMMING AIDS

Product	Manufacturer	%
geoProgrammer	***Berkeley Softworks***	***29.4***
Basic 8	Patech Software	16.3
Basic 64/128	Abacus	11.0
Blitz! 64/128	Skyles	11.0
Merlin	Roger Wagner	11.0
C-128 Assembler Development System	Commodore	9.1
The Better Working Programmer's Toolbox	Spinnaker	6.6
The Better Working Power Assembler	Spinnaker	2.3
Other		3.4

UTILITY PROGRAMS

Product	Manufacturer	%
Big Blue Reader	***S.O.G.W.A.P.***	***29.6***
Billboard Maker	Solutions Unlimited	22.5
Graphics Integrator 2	Inkwell	16.9
The Graphics Transformer	CDA	15.6
1581 Utilities	Free Spirit	11.1
Other		4.3

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Address List of Winners

Beach Head
Access Software
545 W. 550 South, Suite 130
Bountiful, UT 84010

GEOS
geoFile
geoCalc
geoProgrammer
Berkeley Softworks
2150 Shattuck Ave.
Berkeley, CA 94704

Carmen Sandiego series
The Print Shop
Broderbund
17 Paul Drive
San Rafael, CA 94903

Defender of the Crown
Cinemaware
4165 Thousand Oaks Blvd.
Westlake Village, CA 91362

The Bard's Tale series
PaperClip III
Electronic Arts
1820 Gateway Drive
San Mateo, CA 94404

California Games
FastLoad Cartridge
Epyx
PO Box 8020
Redwood City, CA 94063

CAD 3-D
IHT
2269 Chestnut St., Suite 162
San Francisco, CA 94123

Hitchhiker's Guide to the Galaxy
Infocom
125 Cambridgepark Drive
Cambridge, MA 02140

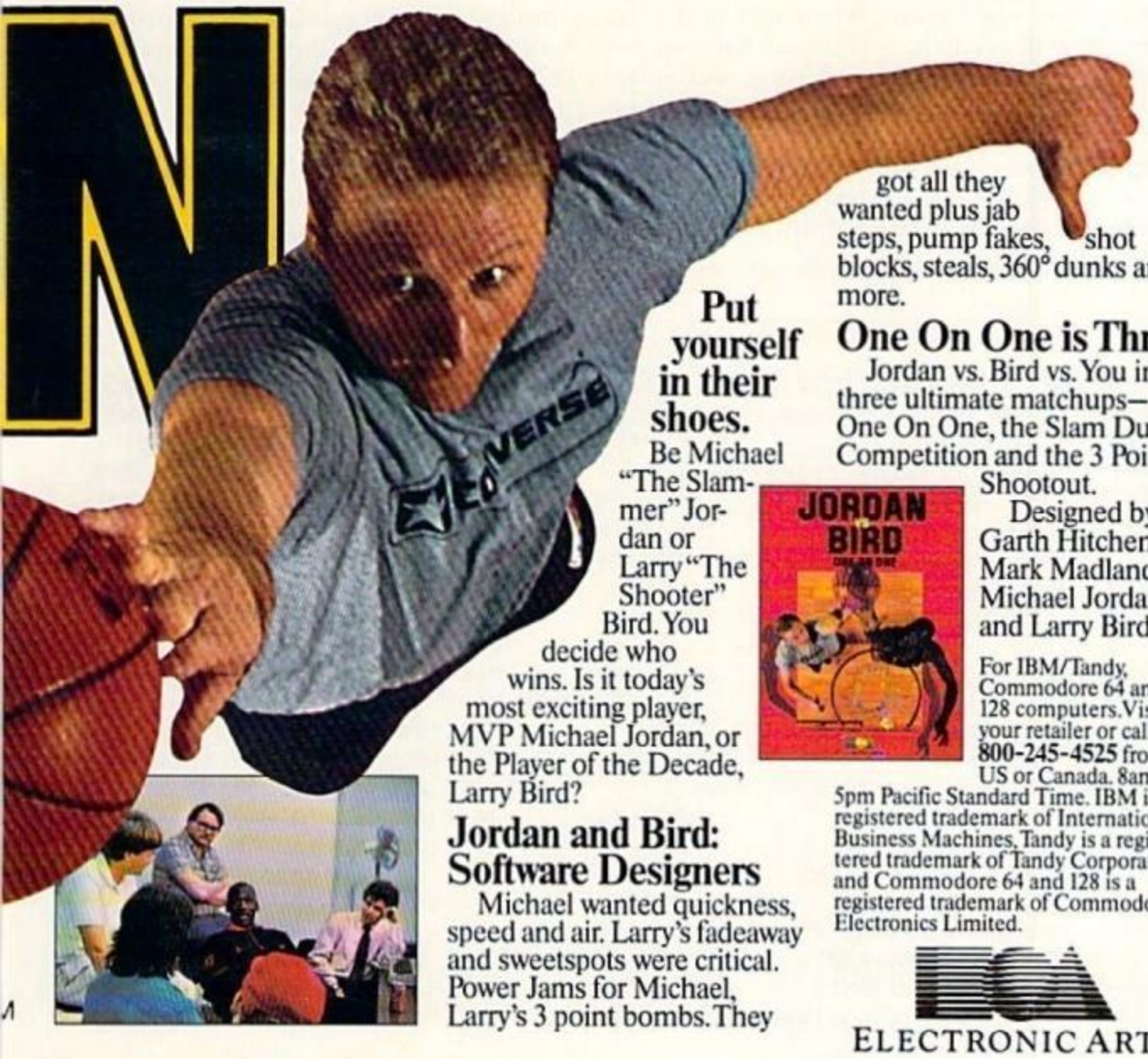
Maniac Mansion
Mediagenic (formerly Activision)
3885 Bohannon Drive
Menlo Park, CA 94025

Bobsterm Pro
Progressive Peripherals and Software
464 Kalamath St.
Denver, CO 80204

Big Blue Reader
S.O.G.W.A.P.
115 Belmont Rd.
Decatur, IN 46733

Roadwar 2000
Strategic Simulations, Inc.
1046 N. Rengstorff Ave.
Mountain View, CA 94043

Flight Simulator II
SubLogic
713 Edgebrook Drive
Champaign, IL 61820 ■



got all they wanted plus jab steps, pump fakes, shot blocks, steals, 360° dunks and more.

Put yourself in their shoes.

Be Michael "The Slammer" Jordan or Larry "The Shooter" Bird. You decide who wins. Is it today's most exciting player, MVP Michael Jordan, or the Player of the Decade, Larry Bird?

Jordan and Bird: Software Designers

Michael wanted quickness, speed and air. Larry's fadeaway and sweetspots were critical. Power Jams for Michael, Larry's 3 point bombs. They

One On One is Three.

Jordan vs. Bird vs. You in three ultimate matchups—One On One, the Slam Dunk Competition and the 3 Point Shootout.

Designed by Garth Hitchens, Mark Madland, Michael Jordan and Larry Bird.

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The Classic Confrontation: One On One. The crowd goes crazy as Michael and Larry unload all their patented moves.

Aerial Warfare: The Air Jordan Slam Dunk Contest. Up to 4 players challenge each other or Michael himself in a battle of Power Jams. Designed by Jordan.

Long Range Bombing: 3 Point Shootout. 25 shots in 60 seconds from 23' out. Don't blow the money ball. Larry's signature event.

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Crazy Caverns

Something's awry in Santa's workshop.
Help him retrieve the missing presents.

By JOHN RYAN

Something's seriously wrong in Christmas Town! A group of rebellious elves has gone on a rampage and stolen some of Santa's finest presents.

As if that weren't bad enough, the gifts have been stashed in caverns below St. Nick's workshop, where they're guarded by crazy mechanical snowmen. It's your job, as Santa, to recover the presents.

As you search, you must tread perilous ice bridges and snow packs, where miscalculation means a long, long drop to the ground. You must also confront crazy snowmen and misshapen Christmas trees, and you'll find events irritatingly unpredictable.

Type in Listing 1, save it to disk and then run it. Then type in and save Listing 2, which will create a high-score file on disk when it's run. Next, plug a joystick into port 2 and load Crazy Caverns with the following boot program:

```
10 IF A=0 THEN A=1 : LOAD
   "+CAVERNS ML ",8,1
20 SYS 16359
```

Be sure to leave the program disk in the drive for further disk accesses.

Crazy Caverns features five screens, one for each cavern where a present is hidden, and five difficulty levels, each one giving you less time to search than the one before. When you find a gift and touch it, a magical sled appears. You must get to it (not easy), and it takes you to the next cavern. If you were really fast, you might even go immediately to a new level without needing the sled. You have five tries to collect the five gifts at each level of difficulty.

A shrinking colored bar—denoting depletion of the air supply—at the right side of the screen indicates the time elapsed. The bar shrinks faster as you progress from level to level. To pause the action, press the P key; to resume play, press any key.

Score is based solely on speed, and, if your score is high enough, you can preserve it in Santa's Hall of Fame for all to see. Just save the score file from the Score menu before exiting the game.

You'll need a keen sense of timing and good distance judgment to succeed at Crazy Caverns—and you can't afford to dally. Christmas Eve is almost here! R

John Ryan is an air traffic control instructor, with considerable responsibility for Santa's safe trip every Christmas eve.

Listing 1. Crazy Caverns program.

```
Ø REM CREATE SANTA'S CAVERNS ML
                          :REM*5
5 OPEN 8,8,8,"+CAVERNS ML ,P,W"
                         :REM*126
1Ø READ A$:IF A$="-1" THEN CLOS
  E8:END                 :REM*78
15 IF LEN(A$)<62 THEN 55
                         :REM*254
2Ø B$=MID$(A$,1,2Ø)+MID$(A$,22,
  2Ø)+MID$(A$,43,2Ø)     :REM*242
25 FOR I=1 TO 3Ø         :REM*181
3Ø C$=MID$(B$,(I*2)-1,2):H$=LEF
  T$(C$,1):L$=RIGHT$(C$,1)
                         :REM*2Ø9
35 H=VAL(H$):IF H$>"9" THEN H=A
  SC(H$)-55              :REM*85
4Ø L=VAL(L$):IF L$>"9" THEN L=A
  SC(L$)-55              :REM*136
45 BY=H*16+L:PRINT#8,CHR$(BY);
                         :REM*67
5Ø NEXT:GOTO 1Ø          :REM*115
55 IF LEN(A$)<21 THEN B$=A$:GOT
  O 7Ø                   :REM*184
6Ø IF LEN(A$)<42 THEN B$=LEFT$(
  A$,2Ø)+RIGHT$(A$,(LEN(A$)-21
  )):GOTO 7Ø             :REM*176
65 B$=LEFT$(A$,2Ø)+MID$(A$,22,2
  Ø)+RIGHT$(A$,LEN(A$)-42)
                         :REM*14Ø
7Ø FOR I=1 TO LEN(B$)/2:REM*221
75 C$=MID$(B$,(I*2)-1,2):H$=LEF
  T$(C$,1):L$=RIGHT$(C$,1)
                         :REM*14Ø
8Ø H=VAL(H$):IF H$>"9" THEN H=A
  SC(H$)-55              :REM*56
85 L=VAL(L$):IF L$>"9" THEN L=A
  SC(L$)-55              :REM*84
9Ø BY=H*16+L:PRINT#8,CHR$(BY);
                         :REM*148
95 NEXT:GOTO 1Ø          :REM*16Ø
1ØØ REM CREATES ML DATA FOR SAN
    TA'S CAVERNS         :REM*127
1Ø1 DATA ØØ4Ø68684CB742Ø1B9Ø1 Ø
    1Ø6ØEØ161ØDØ2Ø6ØEØ1 B9Ø1Ø41
    5Ø4Ø161ØDØ515        :REM*55
1Ø2 DATA Ø4Ø1B9Ø1Ø6Ø2ØEØ161ØD Ø
    7Ø2ØEØ1B9Ø1Ø61BØ4Ø1 61ØDØ71
    BØ4FFABØ1Ø81D        :REM*2
1Ø3 DATA ØCFFB3Ø1Ø81EØCØ1B9Ø1 Ø
    91ØØ3Ø161ØDØA1ØØ3Ø1 B9Ø1ØBØ
    5Ø6Ø164ØBØCØ5        :REM*2Ø2
1Ø4 DATA Ø6Ø1B9Ø1ØFØ2Ø8Ø161ØD 1
    ØØ2Ø8Ø1B9Ø114Ø2ØFØ1 61Ø315Ø
    2ØFØ1B9Ø11416        :REM*223
1Ø5 DATA Ø9Ø161Ø3151Ø69FF63ØF Ø
    ØØØ18FF63ØFØØØ118FF 63ØFØØ1
    F18FF63ØFØØ2Ø        :REM*181
1Ø6 DATA 18Ø1B9Ø117Ø21DØ163ØF 1
    8ØØ21ØØØØØØØØ163Ø9 Ø2Ø9Ø5Ø
    163Ø1Ø219Ø6Ø1        :REM*215
1Ø7 DATA 61Ø5Ø3Ø2Ø2Ø161Ø5Ø6Ø2 Ø
    2Ø163Ø1Ø6ØE11Ø1616Ø5 Ø9Ø2Ø2Ø
    1B9Ø1ØDØ5Ø2Ø1        :REM*88
1Ø8 DATA B9Ø1ØD14Ø2Ø161Ø5ØEØ5 Ø
    2Ø161Ø5ØE14Ø2Ø1616Ø5 1217Ø8Ø
    1615147Ø3Ø1          :REM*2Ø9
1Ø9 DATA 63Ø114ØAØEØ161Ø515Ø2 Ø
    3FF63ØFØØØØ18FF63ØF ØØØ118F
    F63ØFØØ1F18FF        :REM*95 ►
```

RUN it right: **C-64; joystick**

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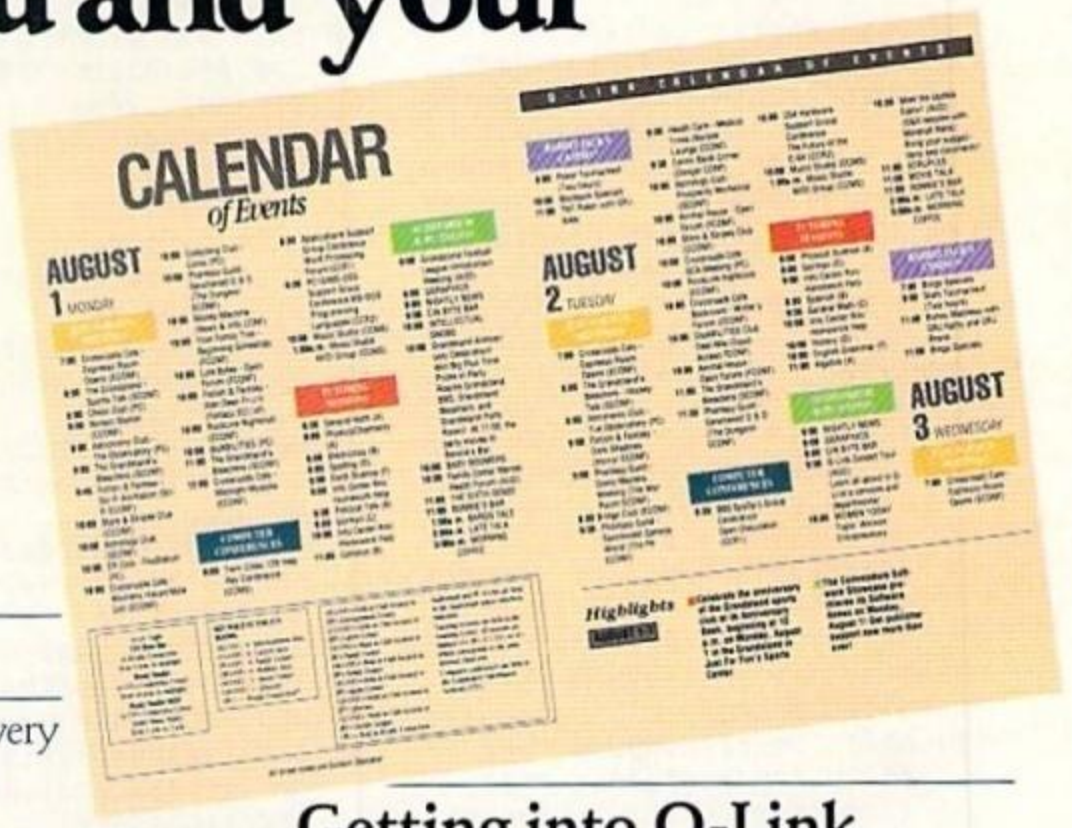

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CRAZY CAVERNS

```
11Ø DATA 63ØFØØ2Ø18Ø1B9Ø117Ø2 1
    DØ163ØF18ØØ21ØØØØØ FFABØ1Ø
    2Ø215FFB3Ø1Ø2        :REM*9Ø
111 DATA Ø315FFABØ1Ø11DØ6FFB3 Ø
    1Ø11EØ6Ø1B9Ø1Ø217Ø6 Ø162ØDØ
    317Ø6Ø161Ø1Ø8        :REM*16Ø
112 DATA ØE03Ø1B9Ø1Ø71BØ4Ø162 Ø
    FØ81BØ4Ø161Ø1ØCØCØ3 Ø163Ø1Ø
    C1AØ5FF63ØF1Ø        :REM*195
113 DATA ØFØ3FF63ØF1Ø1ØØ3Ø163 Ø
    11Ø11Ø9Ø163Ø1111Ø9 Ø163Ø11
    211Ø9FF63ØF1Ø        :REM*2Ø9
114 DATA 1AØ3FF63ØF1Ø1BØ3FF63 Ø
    FØØØØ18FF63ØFØØØ118 FF63ØFØ
    Ø1F18FF63ØFØØ        :REM*114
115 DATA 2Ø18Ø163ØF18ØØ21ØØØØ Ø
    ØØØFFB5Ø1ØØØEØ7Ø163 ØBØ214Ø
    7Ø1B9Ø1Ø5Ø2Ø6        :REM*42
116 DATA Ø161ØEØ6Ø2Ø6Ø163Ø6Ø5 1
    9Ø6Ø163Ø6ØA18Ø7Ø163 Ø6ØEØ2Ø
    9Ø163Ø6ØE11ØE        :REM*5Ø
117 DATA Ø161Ø112Ø2Ø4Ø164Ø116 Ø
    6ØFFF63ØFØØØ18FF63 ØFØØØ11
    8FF63ØFØØ1F18        :REM*42
118 DATA FF63ØFØØ2Ø18Ø1B9Ø117 Ø
    21DØ163ØF18ØØ21ØØØØ ØØØØØ1B
    9Ø1Ø3Ø2Ø6Ø162        :REM*89
119 DATA ØEØ4Ø2Ø6Ø163Ø1Ø5Ø817 Ø
    163Ø1Ø9Ø2ØBØ163Ø1Ø9 ØF1ØØ1B
    9Ø1ØCØ2Ø6Ø162        :REM*165
12Ø DATA ØEØDØ2Ø6Ø163Ø11ØØ2ØC Ø
    163Ø11Ø1AØ5Ø1B9Ø113 17Ø8ØJ6
    3ØF1417Ø8Ø163        :REM*78
121 DATA Ø116Ø216FF63ØFØØØ18 F
    F63ØFØØØ118FF63ØFØØ 1F18FF6
    3ØFØØ2Ø18Ø1B9        :REM*239
122 DATA Ø117Ø21DØ163ØF18ØØ21 Ø
    ØØØØØØØ176Ø1Ø5ØAØ1 Ø1B7Ø1Ø
    5ØB12Ø176Ø1Ø5        :REM*216
123 DATA 1DØ1FFB4Ø1Ø6ØAØEØ176 Ø
    114ØAØ1Ø1AFØ114ØB12 Ø176Ø11
    41DØ1FFAAØ1Ø6        :REM*228
124 DATA 1DØEØØØØØØØØØ2Ø9647 2
    ØEC472ØFB4AA9ØØ2Ø9Ø FF2ØDF4
    A2Ø4C48AD16DØ        :REM*48
125 DATA Ø91Ø8D16DØA9ØD8D22DØ A
    9Ø28D23DØA2ØØBD9156 9DC5Ø3E
    8EØØCDØF52Ø12        :REM*166
126 DATA 4DA2Ø28E2ØDØCACA8E21 D
    Ø8EA7558EA8558EE855 8EA8Ø2A
    9Ø58DAB55A964        :REM*166
127 DATA 8DE655A9ØØ8DB642ADA8 Ø
    2C9Ø59ØØ6AD35Ø38DA8 Ø2A9ØØ8
    D15DØ8DCF558D        :REM*124
128 DATA DØ558DC655AD11DØ29EF 8
    D11DØA9932ØD2FF2ØØ9 47A2ØØ8
    E94558ED455AE        :REM*228
129 DATA E855BDE9558DE455A2ØØ A
    9Ø19D4C55E8EØØ5DØF8 AEA8Ø2A
    9Ø18DDØ55BDD9        :REM*98
13Ø DATA 558D21DØA9932ØD2FF2Ø 6
    94D2Ø824D2ØC44D2ØFC 4D2ØØE4
    E2Ø2Ø4E2Ø8C4E        :REM*228
131 DATA 2Ø265ØAD11DØØ91Ø8D11 D
    ØA91Ø2Ø7E472Ø5B472Ø 6847AD1
    EDØAD1FDØ18AD        :REM*251
132 DATA A8Ø28D35Ø3A9ØØ8DD455 2
    ØE4FFC95ØDØ422Ø8AFF A218AØ2
    2182ØFØFFE6C7        :REM*1Ø2
133 DATA A9Ø78D86Ø2A915A2562Ø 8
    84B2ØE4FFFØFB2ØF24E A9ØØ85C
    7A218AØ22182Ø        :REM*54
134 DATA FØFFAØØ5A92Ø2ØD2FF88 D
    ØF8A9Ø18D86Ø24CF343 4C2745A
    D9455C9Ø2DØØB        :REM*1Ø9
135 DATA A9ØØ8D94552Ø9F484CØD 4
    3ADAF55FØØ8A9ØØ8DAF 554C4E4
    42Ø9848ADB642        :REM*234
136 DATA FØØ34CØD432Ø5B472Ø68 4
    79Ø36EEBD55A2Ø72Ø42 47ADDØ5
    53ØØ9EEØØDØEE        :REM*228
137 DATA Ø2DØ4C5B44CEØØDØCEØ2 D
    Ø4C5B44A9ØØ8DBD552Ø D349BØ1
    2A9ØØ8DC655A9        :REM*88
138 DATA 1F8DD3554CC445ADBD55 D
    ØE42Ø5B472ØAC46ADC6 55FØ851
    Ø54ADDØ55C9FF        :REM*2Ø4
139 DATA FØØDA9FF8DDØ55A9ØØ8D D
    4552ØEE46ADØØDØC928 BØØ34C1
    245A2462Ø4247        :REM*25
14Ø DATA 38ADØØDØE9Ø48DØØDØ8D Ø
    2DØ2Ø9848ADB642FØØ3 4CØD432
    Ø5B47BØ122Ø68        :REM*59
141 DATA 47BØ61A9ØØ8DC655A91F 8
    DD3554CC4454C1245AD DØ55C9Ø
    1FØØDA9Ø18DDØ        :REM*216
142 DATA 55A9ØØ8DD4552ØD346AD Ø
    ØDØC9F99ØØ34C1245A2 462Ø424
    718ADØØDØ69Ø4        :REM*236
143 DATA 8DØØDØ8DØ2DØ2Ø9848AD B
    642FØØ34CØD432Ø5B47 BØ122Ø6
    847BØØDA9ØØ8D        :REM*217
144 DATA C655A91F8DD3554CC445 A
    DCF5549Ø18DCF55AABD CB558DF
    8Ø7BDCD558DF9        :REM*57
145 DATA Ø7ADC955DØØ34C9F43A9 8
    B8DF8Ø7A98Ø8DF9Ø7A9 258DD25
    5A9ØØ8DD155A9        :REM*192
146 DATA ØB8D18D4A9AC8DØ5D4A9 Ø
    78DØ6D4A9328DØØD4A9 Ø48DØ1D
    4A9218DØ4D4A9        :REM*81
147 DATA 2Ø8DØ4D42Ø1946 2Ø9848 A
    DB642FØØ34CØD432Ø5B 47CED25
    5DØEAADC655FØ        :REM*166
148 DATA 3EADDØ551Ø1EAEØ2DØEØ 2
    89Ø32A9Ø78DB855CA8E ØØDØ8EØ
    2DØ2Ø4B47CEB8        :REM*171
149 DATA 55DØF14CBF45AEØ2DØEØ F
    2BØ14A9Ø78DB855E88E ØØDØ8EØ
    2DØ2Ø4B47CEB8        :REM*71
15Ø DATA 55DØF1A9ØØ8DD355A9Ø6 8
    DCØ552Ø98482Ø5B472Ø 6847A9Ø
    88DD255A9FF8D        :REM*61
151 DATA D1552Ø1946 2Ø9848ADB6 4
    2FØØ34CØD432Ø5B47BØ 12ADBC5
    5DØØ52Ø6847BØ        :REM*57
152 DATA Ø8CED255DØDE4CC945AD D
    355C94A9ØØ9EED4552Ø 9F484CØ
    D43A9ØØ8DBC55        :REM*89
153 DATA 4C9F43A2Ø72Ø4247ADD1 5
    53ØØCCEØ1DØCEØ3DØEE D3554C3
    846EEØ1DØEEØ3        :REM*114
154 DATA DØEED355ADC655FØ3D1Ø 1
    FADØØDØC9289Ø34ADD1 551ØØAC
    ECØ55DØ2AA9Ø6        :REM*152
155 DATA 8DCØ55CEØØDØCEØ2DØ4C 7
    A46ADØØDØC9F9BØ15AD D1551ØØ
    ACECØ55DØØBA9        :REM*31
156 DATA Ø68DCØ55EEØØDØEEØ2DØ 6
    Ø18A5B3692885B3A5B4 69ØØ85B
    418A5B5692885        :REM*249
157 DATA B5A5B669ØØ85B66ØA9FF 8
    DØFD4A98Ø8D12D4EEC8 55AD1BD
    4CDC855BØF86Ø        :REM*224
158 DATA A9ØØ8DC955AAA8ADØØDC 4
    ABØØ1884ABØØ1C84ABØ Ø1CA4AB
    ØØ1E84A8EC655        :REM*225
159 DATA 8CC755BØØ3EEC9556ØAØ Ø
    ØB93B5499CØ22C8CØ8Ø DØF5AØØ
    ØB9FE5Ø99ØØ2Ø        :REM*27
16Ø DATA C8CØ8ØDØF56ØAØØØB91D 5
    799CØ22C8CØ8ØDØF5AØ ØØB99D5
    699ØØ2ØC8CØ8Ø        :REM*166
161 DATA DØF56Ø2ØD346A98B8DF8 Ø
    7A98Ø8DF9Ø7A9Ø28D27 DØA9Ø18
    D1CDØ8D28DØA9        :REM*59
162 DATA Ø18D25DØA9288DØØDØ8D Ø
    2DØAEA8Ø2BD1Ø568DØ1 DØ8DØ3D
    ØA9FF8D15DØ6Ø        :REM*22Ø
163 DATA AØØØ88DØFDCADØF86ØA9 Ø
    A8DB555AØFF88DØFDCE B555DØF
    66ØAD1FDØ29Ø2        :REM*183
164 DATA C9Ø2FØØ2186Ø386ØADD8 5
    529Ø4C9Ø4FØØ2186ØAD D85529Ø
    2C9Ø2DØF5386Ø        :REM*39
165 DATA 8DBB55AD1EDØ8DD855AD D
    8552DBB55CDBB55FØØ2 186Ø386
    ØA9ØØ85A7A9DØ        :REM*18Ø
166 DATA 85A8A9ØØ85A9A93Ø85AA A
    DØEDC29FE8DØEDCA5Ø1 29FB85Ø
    1A2Ø8AØØØB1A7        :REM*158
167 DATA 91A9C8DØF92ØDE47CADØ F
    1A5Ø1Ø9Ø485Ø1ADØEDC Ø9Ø18DØ
    EDCAD18DØ29FØ        :REM*185
168 DATA Ø9ØC8D18DØ6Ø18A5A869 Ø
    185A8A5AA69Ø185AA6Ø A2Ø98EC
    455A97E859BA9        :REM*14Ø
169 DATA 52859CA9Ø98DC255A9ØØ 8
    DC355AØØØB19B8DC555 A9ØØ85A
    9A93Ø85AAADC5        :REM*133
17Ø DATA 55FØ1218A5A969Ø885A9 A
    5AA69ØØ85AACEC555DØ EEAØØ1A
    2Ø7B19B8891A9        :REM*4Ø
171 DATA C8C8CA1ØF618A59B6DC2 5
    5859BA59C6DC355859C CEC455D
    ØB86ØAØØØB9C6        :REM*149
172 DATA 5299ØØCØC8CØB4DØF56Ø A
    ØØØB9EØ55AA8EDE558C DF55ADD
    455FØØBAEDE55        :REM*216
173 DATA 2ØØ6CØA2Ø52Ø4247AEDE 5
    52ØØ3CØEEDF55ACDF55 CØØ4DØD
    66Ø2ØEB4CA9ØF        :REM*1ØØ
174 DATA 8DC2552Ø5A48CEC255DØ F
    86ØA91Ø2Ø7E479Ø6FEE D4552Ø8
    748A9ØØ8DD455        :REM*76
175 DATA ADAB55C9Ø1FØØ9CEAB55 E
    EB6424CØD4338ADA755 EDA9558
    DC255ADA855ED        :REM*22
176 DATA AA55ØDC255BØØ5FØØ34C E
    348ADA7558DA955ADA8 558DAA5
    52ØFC4DA9Ø18D        :REM*238
177 DATA 86Ø2A2Ø1AØØC182ØFØFF A
    9Ø5A2562Ø884BA9Ø58D E755A2F
    F2Ø4247CEE755        :REM*245
178 DATA DØF668682Ø8AFF4CØ94B A
    92Ø8DBB552Ø87479ØØ3 4C9F48A
    94Ø8DBB552Ø87        :REM*112
```

Continued on p. 111.

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Finance 128

Step high finance down to an understandable level with this loan and investment calculator.

By JIM WICKES

If you need to borrow some money or have some extra to invest, Finance for the C-128 will track the value of possible loans or investments over time. It can assist you with everything from major purchases to a retirement fund, and is a powerful learning tool, as well. The entry screens feature an easy, fill-in-the-blanks format, and the entire program runs from the numeric keypad.

Finance 128's menu is shown in Figure 1. As you can see, the first six options concern loans. When you select Regular Payments, enter the dollar value of the loan as the amount financed, the interest rate in percent (12.25, for example), the term of the loan in years and the number of payments per year. The program will then compute your regular payment, total amount of the payments and total interest over the course of the loan.

Loan payments seldom work out to exact dollars-and-cents amounts, so it's customary to make an adjustment on the last installment. To compute it, use the Last Payment option. Amount Financed works backward from Regular Payments to determine the amount of the original loan.

Balance of a Loan is handy for determining a loan payoff amount. For any payment number, enter the number of payments you've already made, plus one. Term of a Loan takes a desired monthly payment and known interest rate to calculate the term in years. Annual Interest Rate is calculated from the principal amount of the loan and payment information.

Options 7–12 concern investments that accrue compound interest. Future Value computes the value of any investment at any future date, and Initial Investment operates in reverse. Regular Withdrawals and Minimum for Withdrawal are concerned with regular withdrawals from an investment. Future Value of Regular Deposits calculates the future value of an investment built with regular additions. Nominal Interest Rate figures the annual interest rate (as opposed to the effective interest from compounding).

Figure 1. Finance 128 menu.

Loans

1. Regular Payments
2. Last Payment
3. Amount Financed
4. Balance of a Loan
5. Term of a Loan
6. Annual Interest Rate

Investments

7. Future Value
8. Initial Investment
9. Regular Withdrawals
10. Minimum for Withdrawal
11. Future Value of Regular Deposits
12. Nominal Interest Rate

While I've taken pains to provide a bug-free program, some degree of common sense is required on your part. Obviously, a loan of $100,000 can never be repaid at $25 a month. There are also limits in the program. The interest rate must be less than 100%, the maximum principal amount less than ten million dollars, the number of years less than 100, and the maximum loan payment must be no more than $999.

Help is available in the header message block, and pressing the escape key will get you out of any option. If you make a mistake during entry, use the cursor-up key to return to the line to be corrected.

I've kept Finance 128 short and simple. Custom printouts, an 80-column screen, disk routines, and so forth, could be easily added, but those possibilities, my friends, I leave to you! R

Jim Wickes, who now runs a small consulting firm, is proficient in Basic, Fortran and machine language and at one time programmed for a minicomputer he bought to speed operations in a former business venture.

Listing 1. Finance 128 program.

```
10 REM FINANCE 128 - WICKES          :REM*221
40 POKE5328Ø,Ø: POKE53281,Ø          :REM*88
50 PRINT CHR$(147) CHR$(5) CHR$
   (142) "PLEASE WAIT"  :REM*9Ø
60 DIM E$(4), K$(18), M$(12)
                                     :REM*15Ø
70 DIM K%(18), P%(12,9), T%(8),
   V(8)                              :REM*95
80 GOTO 79Ø                          :REM*176
90 REM INPUT ---                     :REM*117
100 A=K%(K): CHAR,X,Y,C$: A$=""
    : W=Ø                            :REM*176
110 POKE2599,Ø: DO UNTIL W=A
                                     :REM*135
120 E=Ø: GETKEY B$: J=INSTR(I$,
    B$): IF J=13 THEN EXIT
                                     :REM*58
130 IF J=Ø THEN GOSUB 18Ø: ON E
     GOTO 12Ø, 15Ø, 15Ø:REM*119
140 PRINT B$;: A$=A$+B$: W=W+1:
     POKE2Ø8,Ø                       :REM*186
150 LOOP: POKE2599,1: PRINT C$;
                                     :REM*143
160 Q=INT(VAL(A$)*1ØØ+.5)/1ØØ:
    RETURN                           :REM*172
170 REM INPUT ERR ---  :REM*172 ►
```

RUN it right: **C-128, in 40-Column mode.**

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FINANCE 128

```
18Ø J=INSTR(J$,B$): E=1: B$=""
                          :REM*194
19Ø ON J GOTO 2ØØ, 21Ø, 21Ø, 22
    Ø, 22Ø: RETURN        :REM*26
2ØØ E=Ø: B$=" ": RETURN:REM*132
21Ø E=J: W=A: RETURN     :REM*167
22Ø IF W<=Ø THEN W=Ø: RETURN
                          :REM*21Ø
23Ø W=W-1: A$=LEFT$(A$,W): CHAR
    ,X,Y,A$+C$: RETURN :REM*196
24Ø X=POS(X): CHAR,X,Y+1,"{2 CO
    MD Ts}": RETURN      :REM*156
25Ø CHAR,22,1,E$(B): RETURN
                          :REM*33
26Ø REM REG PMTS ----    :REM*213
27Ø I=V(2)/1ØØ: N=V(3)*V(4)
                          :REM*224
28Ø R=V(1)*(I/V(4))/(1-(1+(I/V(
    4))){UP ARROW}-N)     :REM*51
29Ø V(5)=INT(R*1ØØ+.5)/1ØØ: V(6
    )=V(5)*N: V(7)=V(6)-V(1)
                          :REM*2Ø5
3ØØ RETURN                :REM*187
31Ø REM AMT FINANCED ---
                          :REM*191
32Ø I=V(2)/1ØØ: N=V(3)*V(4)
                          :REM*146
33Ø V(5)=(V(1)/(I/V(4)))*(1-(1+
    (I/V(4))){UP ARROW}-N)
                          :REM*156
34Ø V(6)=N*V(1): V(7)=V(6)-V(5)
                          :REM*96
35Ø RETURN                :REM*237
36Ø REM LAST PMT ---      :REM*49
37Ø B=4: GOSUB 25Ø        :REM*119
38Ø S=V(1):I=V(3)/1ØØ: P=V(5):
    N=V(4)*P              :REM*147
39Ø IF M>3 THEN N=V(5): P=V(4)
                          :REM*229
4ØØ IF M=5 THEN N=1ØØ*P:REM*2Ø7
41Ø FOR W=1 TO N: IF S<=Ø THEN
    47Ø                   :REM*193
42Ø J=INT((S*I/P)*1ØØ+.5)/1ØØ
                          :REM*113
43Ø Z=V(2)-J: S=S-Z       :REM*68
44Ø X=27: Y=T%(6)         :REM*161
45Ø CHAR,X,Y: PRINT USING N$;S+
    V(2)                  :REM*223
46Ø NEXT: B=2: GOTO 49Ø:REM*247
47Ø B=Ø: K=2: Q=INT(((W-1)/P)*1
    ØØ+.5)/1ØØ            :REM*145
48Ø A$=STR$(Q): E$(Ø)="PAYOUT =
     "+RIGHT$(A$,5)+" YR"
                          :REM*62
49Ø V(6)=S+V(2): Z=V(6):REM*139
5ØØ IF M=4 THEN V(6)=S: Z=S+V(2
    ): IF S<Ø THEN V(6)=Ø
                          :REM*198
51Ø V(7)=(W-2)*V(2)+Z: V(8)=V(7
    )-V(1)                :REM*255
52Ø IF M=5 THEN V(5)=Q: B=2
                          :REM*15Ø
53Ø RETURN                :REM*162
54Ø REM APR ---           :REM*135
55Ø A=V(1): P=V(4): N=V(3)*P
                          :REM*244
56Ø I=1: J=Ø: Z=Ø: R=Ø: Q=V(2)*
    N                     :REM*118
57Ø B=4: GOSUB 25Ø: B=2:REM*25Ø
```

Screen shot of Finance 128's Loan and Investment menu.

```
58Ø V(2)=VAL(STR$(V(2))): IF Q<
    =A THEN 64Ø           :REM*171
59Ø DO: R=(I*A/P)/(1-1/((I/P+1)
    {UP ARROW}N))         :REM*232
6ØØ R=INT(R*1ØØ+.5)/1ØØ: R=VAL(
    STR$(R))              :REM*178
61Ø Z=ABS(I-J)/2: J=I: IF V(2)=
    R THEN EXIT           :REM*138
62Ø I=I+Z*(V(2)-R)/ABS(V(2)-R)
                          :REM*114
63Ø LOOP: V(5)=I*1ØØ      :REM*249
64Ø RETURN                 :REM*13
65Ø REM LOANS ---          :REM*95
66Ø P=V(4): I=V(2)/1ØØ/P: N=P*V
    (3)                   :REM*137
67Ø ON M-6 GOTO 68Ø, 7ØØ, 71Ø,
    73Ø, 75Ø, 77Ø         :REM*192
68Ø V(5)=V(1)*((1+I){UP ARROW}N
    )                     :REM*26
69Ø V(6)=V(5)-V(1): RETURN
                          :REM*165
7ØØ V(5)=V(1)/((1+I){UP ARROW}N
    ): RETURN             :REM*62
71Ø Z=V(1)*I/(1-(1+I){UP ARROW}
    -N): V(5)=INT(Z*1ØØ+.5)/1ØØ
                          :REM*1Ø
72Ø V(6)=V(5)*N-V(1): RETURN
                          :REM*11Ø
73Ø V(5)=V(1)/I*(1-1/((1+I){UP
    ARROW}N))              :REM*2
74Ø V(6)=V(1)*N-V(5): RETURN
                          :REM*19Ø
75Ø V(5)=(V(1)/I)*((1+I){UP ARR
    OW}N-1)               :REM*82
76Ø V(6)=V(5)-V(1)*N: RETURN
                          :REM*1ØØ
77Ø V(5)=P*((V(1)/V(2)){UP ARRO
    W}(1/N)-1)*1ØØ: RETURN
                          :REM*19
78Ø REM INITIALIZE --- :REM*19Ø
79Ø H$="{HOME}{CTRL 9}{3 SPACEs
    }FINANCE PROGRAM{9 SPACEs}M
    ESSAGE{7 SPACEs}{CTRL Ø}{5
    SPACEs}MAIN MENU{5 SPACEs}{
    CTRL 9}{2 SPACEs}{CTRL Ø}{2
     SPACEs}<ESC> = QUIT{3 SPAC
    Es}{CTRL 9} {CTRL Ø}{4Ø COM
    D Us}"+CHR$(27)+CHR$(64)
                          :REM*34
8ØØ I$=" .Ø123456789"+CHR$(13)
                          :REM*8Ø
```

```
81Ø J$=CHR$(29)+CHR$(27)+CHR$(1
    45)+CHR$(2Ø)+CHR$(157)
                          :REM*1Ø5
82Ø U$=" {11 COMD Ts}": C$=CHR$
    (27)+"Q"              :REM*59
83Ø N$="#$######.##": K%(Ø)=3
                          :REM*47
84Ø D$="----------------------
    -"                    :REM*167
85Ø S$="{1Ø SPACEs}"      :REM*125
86Ø FOR L=1 TO 12: READ M$(L):
    NEXT                  :REM*143
87Ø FOR L=1 TO 4: READ A$
                          :REM*81
88Ø E$(L)=LEFT$("{2 SPACEs}"+A$
    +S$,17): NEXT         :REM*1Ø2
89Ø FOR L=1 TO 18          :REM*66
9ØØ READ K%(L), K$(L): NEXT
                          :REM*221
91Ø FOR L=1 TO 12: READ P%(L,Ø)
                          :REM*37
92Ø FOR J=1 TO P%(L,Ø): READ P%
    (L,J)                 :REM*199
93Ø NEXT J: READ P%(L,9): NEXT
    L                     :REM*75
94Ø REM START PROGRAM ---:REM*3
95Ø PRINT H$;: CHAR,Ø,3," LOANS
    "                     :REM*1ØØ
96Ø PRINT: PRINT" {5 COMD Ts}":
     FOR L=1 TO 12        :REM*234
97Ø PRINT L; "(CRSR LF). " M$(L
    )                     :REM*212
98Ø IF L=6 THEN PRINT "{2 CRSR
    DNs} INVESTMENTS": PRINT U$
                          :REM*194
99Ø NEXT: Y=22: M=Ø       :REM*251
1ØØØ K=Ø: CHAR,1,Y,"OPTIONS (1-
    12){2 SPACEs}": GOSUB 24Ø:
     POKE2Ø8,Ø            :REM*87
1Ø1Ø GOSUB 1ØØ: IF E=2 THEN END
                          :REM*2Ø7
1Ø2Ø M=INT(Q): IF M<1 OR M>12 T
    HEN 1Ø1Ø              :REM*52
1Ø3Ø PRINT H$;: X=1: Y=4
                          :REM*166
1Ø4Ø CHAR,1,1,LEFT$(M$(M)+S$,18
    ): Z=P%(M,9)          :REM*184
1Ø5Ø FOR L=1 TO P%(M,Ø): K=P%(M
    ,L)                   :REM*51
1Ø6Ø CHAR,X,Y,K$(K): T%(L)=Y
                          :REM*4Ø
1Ø7Ø IF L<=Z THEN CHAR,39-K%(K)
    ,Y+1,RIGHT$(U$,K%(K)-1)
                          :REM*7
1Ø8Ø Y=Y+2: IF L=Z THEN CHAR,X,
    Y,D$: Y=Y+3           :REM*7Ø
1Ø9Ø NEXT: L=1            :REM*2Ø8
11ØØ DO UNTIL L=P%(M,9)+1: B=2:
     IF L=1 THEN B=1      :REM*125
111Ø K=P%(M,L): X=39-K%(K): Y=T
    %(L)                  :REM*23
112Ø GOSUB 25Ø: GOSUB 1ØØ: IF E
    =2 THEN EXIT          :REM*64
113Ø IF E=3 AND L>1 THEN L=L-1:
     GOTO118Ø             :REM*163
114Ø IF A$="" AND V(L)>Ø THEN Q
    =V(L)                 :REM*174
115Ø IF LEN(STR$(INT(Q)))-1 > A
    -4 OR Q=Ø THEN B=3: GOTO 1 ►
```


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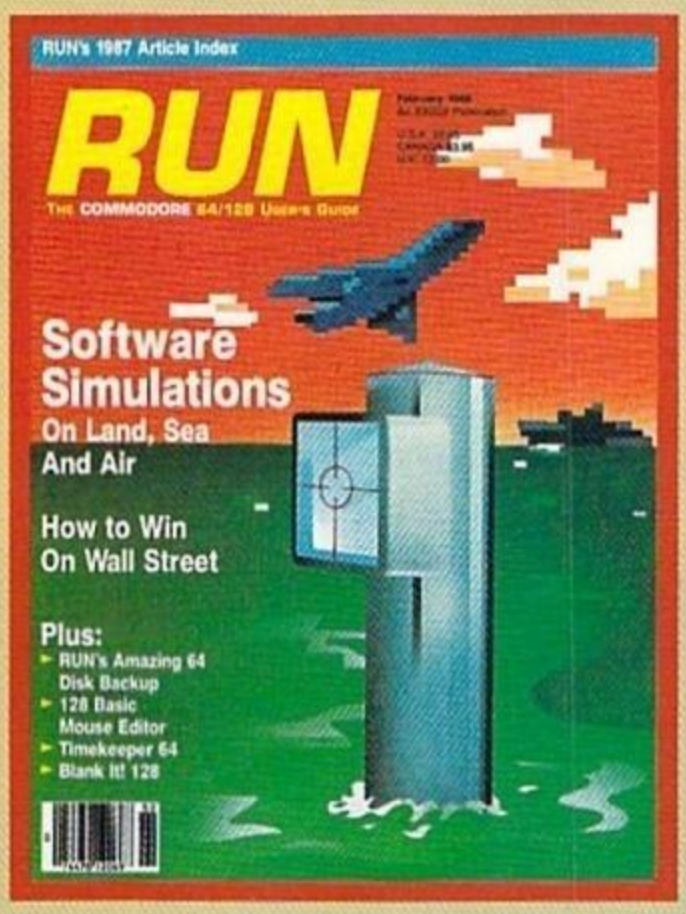

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FINANCE 128

```
    12Ø                    :REM*113
116Ø CHAR,X-1,Y,C$: PRINT USING
     RIGHT$(N$,K%(K));Q
                           :REM*185
117Ø V(L)=Q: L=L+1         :REM*2ØØ
118Ø LOOP: IF E=2 THEN Q=Ø: GOT
     O 127Ø                :REM*222
119Ø ON M GOSUB 27Ø, 37Ø, 32Ø,
     37Ø, 37Ø, 55Ø, 66Ø, 66Ø, 6
     6Ø, 66Ø, 66Ø, 66Ø  :REM*61
12ØØ FOR L=P%(M,9)+1 TO P%(M,Ø)
                           :REM*235
121Ø K=P%(M,L): X=38-K%(K): Y=T
     %(L)                  :REM*189
122Ø CHAR,X,Y: PRINT USING RIGH
     T$(N$,K%(K));V(L): NEXT: P
     OKE2Ø8,Ø              :REM*235
123Ø Y=T%(L-1)+2: CHAR,1,Y,"<1>
      RESTART{2 SPACEs}<2> MENU
     {2 SPACEs}": GOSUB 24Ø
                           :REM*23Ø
124Ø Z=Ø: K=Ø: GOSUB 25Ø: GOSUB
      1ØØ                  :REM*215
125Ø ON E GOTO 124Ø, 127Ø, 129Ø
                             :REM*4
126Ø IF Q>2 THEN B=3: GOTO 124Ø
                           :REM*113
127Ø FOR L=1 TO 8: V(L)=Ø: NEXT
                           :REM*69
128Ø L=1: ON Q GOTO 1Ø3Ø: GOTO
     95Ø                   :REM*251
129Ø L=P%(M,9): GOTO 11ØØ
                           :REM*128
13ØØ DATA REGULAR PAYMENTS, LAS
     T PAYMENT             :REM*113
131Ø DATA AMOUNT FINANCED, BALA
     NCE OF A LOAN         :REM*198
132Ø DATA TERM OF LOAN, ANNUAL
     INTEREST RATE         :REM*158
133Ø DATA FUTURE VALUE, INITIAL
      INVESTMENT           :REM*31
134Ø DATA REGULAR WITHDRAWLS, M
     IN. FOR WITHDRAWL     :REM*19
135Ø DATA FUTURE VAL REG DEPOSI
     TS, NOMINAL INTEREST RATE
                           :REM*228
136Ø REM                   :REM*218
137Ø DATA <ESC> = MENU, <{UP AR
     ROW}> = BACKUP, INVALID EN
     TRY, COMPUTING...     :REM*179
138Ø REM PROMPT S/U ---    :REM*75
139Ø DATA 11,AMOUNT FINANCED,6,
     ANNUAL INTEREST RATE (%)
                           :REM*1
14ØØ DATA 6,NUMBER OF YEARS,6,P
     AYMENTS PER YEAR      :REM*175
141Ø DATA 11,REGULAR PAYMENT AM
     OUNT,11,TOTAL OF PAYMENTS
                           :REM*71
142Ø DATA 11,TOTAL INTEREST PAI
     D,11,LAST PAYMENT AMOUNT
                           :REM*124
143Ø DATA 7,LOAN PAYMENT NUMBER
     ,11,LOAN BALANCE AMOUNT
                           :REM*113
144Ø DATA 11,INITIAL INVESTMENT
     ,6,COMPOUNDING PERIODS / Y
     R                     :REM*222
145Ø DATA 11,FUTURE VALUE AMOUN
     T,11,TOTAL INTEREST EARNED
                           :REM*98
146Ø DATA 11,AMT OF REGULAR WIT
     HDRAWL,6,WITHDRAWLS PER YE
     AR                    :REM*87
147Ø DATA 11,AMT OF REGULAR DEP
     OSITS,6,NUMBER OF DEPOSITS
      PER YEAR             :REM*127
148Ø REM PROMPT SEQ ---    :REM*68
149Ø DATA 7,1,2,3,4,5,6,7,4,8,1
     ,5,2,3,4,8,6,7,5,7,5,2,3,4
     ,1,6,7,4              :REM*224
15ØØ DATA 8,1,5,2,4,9,1Ø,6,7,5,
     8,1,5,2,4,3,8,6,7,4,5,1,5,
     3,4,2,4               :REM*15
151Ø DATA 6,11,2,3,12,13,14,4,5
     ,13,2,3,12,11,4,6,11,2,3,1
     6,15,14,4             :REM*17Ø
152Ø DATA 6,15,2,3,16,11,14,4,6
     ,17,2,3,18,13,14,4,5,13,11
     ,3,12,2,4             :REM*135 ■
```

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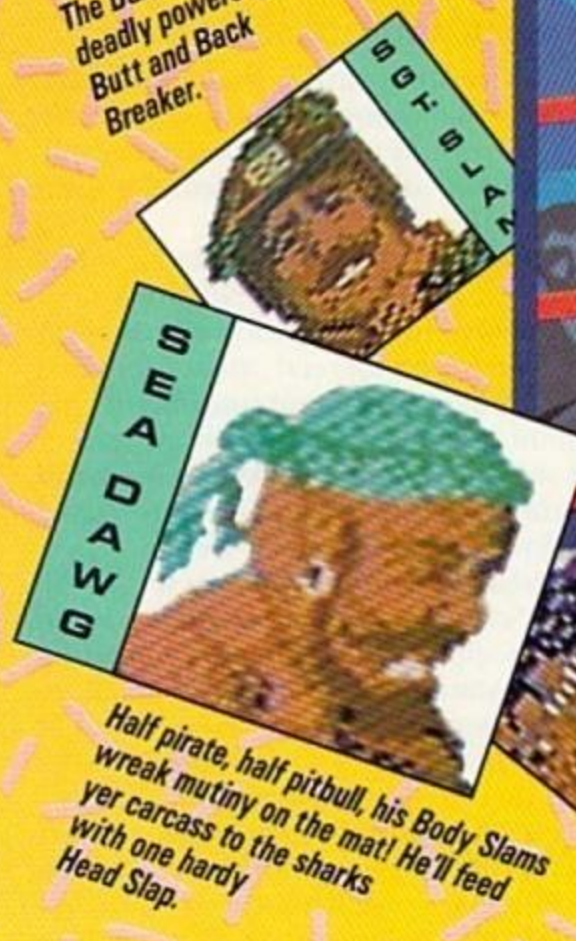
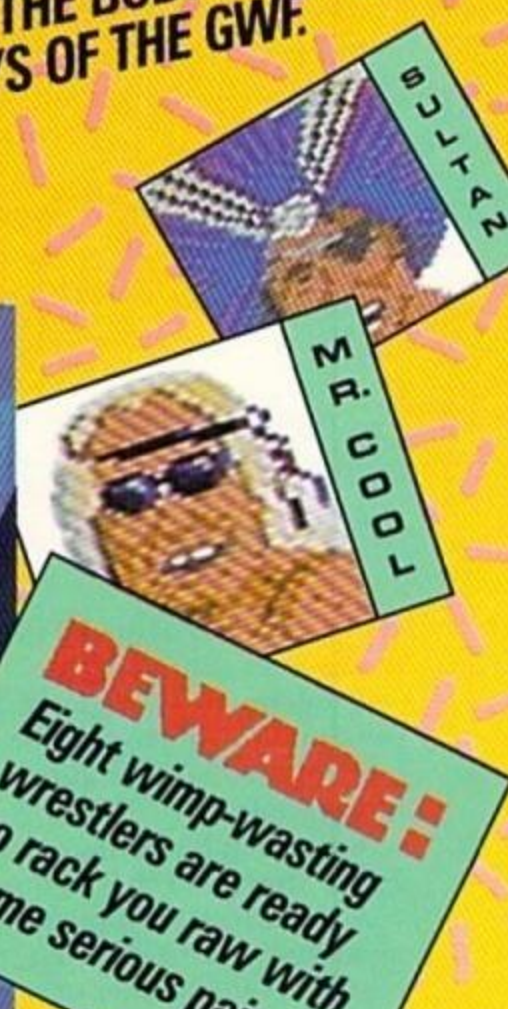
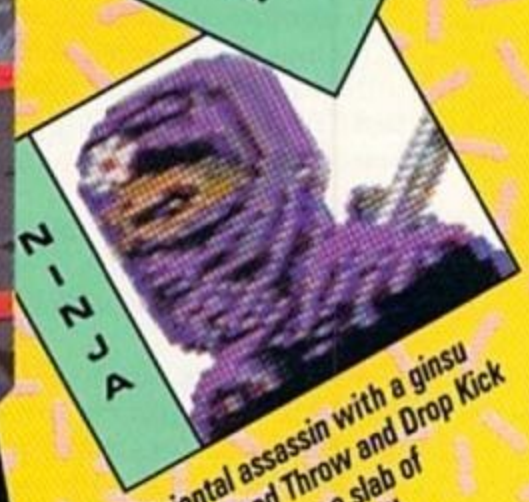


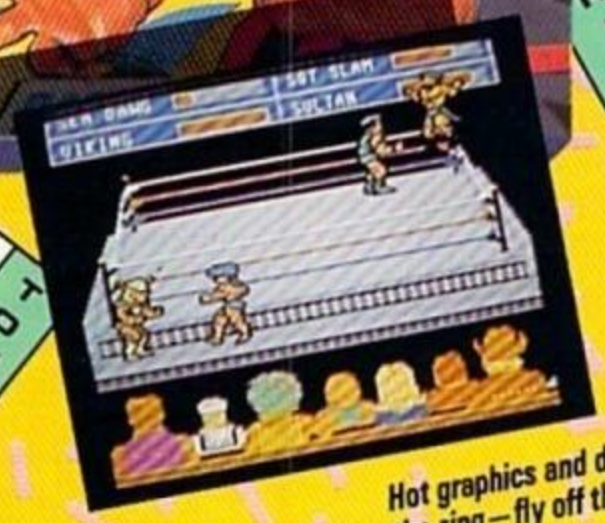
Half pirate, half pitbull, his Body Slams wreak mutiny on the mat! He'll feed yer carcass to the sharks with one hardy Head Slap.



BEWARE: Eight wimp-wasting wrestlers are ready to rack you raw with some serious pain.



The Oriental assassin with a ginsu style, his Head Throw and Drop Kick will chop you into a slab of sniveling sushi. Banzai!



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GEOS Contest Winners

Here are the winning entries in the Berkeley Softworks' Desktop Publishing Contest.

QUESTION: What do the following people have in common?

A salesman in Albuquerque uses a presentation notebook for selling intensive-care heart-monitoring systems to hospitals.

A pastor in Bloomington, Illinois, creates a Mother's Day cookbook.

A food-service director in Florida produces charts showing number of meals served, number of man-hours involved, cost per meal and total costs.

A laboratory director and a professor of biology coauthor a scientific report—with graphs, diagrams and tables—entitled "Toxic Effects of Copper Sulfate on Selected Freshwater Plankton."

ANSWER: They're all Commodore users who are finding practical desktop publishing applications with GEOS.

And they are but a sampling of the hundreds of entrants in the recent Berkeley Softworks desktop publishing contest. Equipped with geoPaint and geoWrite (as well as geoPublish, Writer's Workshop and Graphics Grabber, in many cases), contestants submitted their best applications in one of seven different categories.

As the number of people who use GEOS continues to climb, housemakers, engineers, students, retired people and service personnel are discovering everyday uses for GEOS—at home, at work and in school. Desktop publishing combines word processing, page layout and graphic design to allow users to create newsletters, spruce up reports or documents or design announcements and business forms.

The desktop publishing contest is proof-positive that Commodore computerists don't need to spend several thousands of dollars for a 16-bit computer set-up.

As judges in this contest, we at *RUN* were impressed with the effort and ingenuity that went into these GEOS submissions. For example, how many would have thought of selling their home with a GEOS-generated flyer, complete with floor plans? Or creating designs with geoPaint used on a stencil for etching on glass mirrors? Newsletters, invitations, stationery, cards, booklets, and so on, are obvious applications. If you have a publishing need, then GEOS probably is the answer.

Other Unusual GEOS Applications

We noticed many applications for GEOS in the office or studio—from the graphic designer in California who designed his company's stationery, business cards and invoices to the Tennessee training coordinator who created a client handbook used in the treatment of chemical dependency at a detoxification rehabilitation institute.

Besides the workplace, GEOS is also used in schools. For example, an electrical engineering student at the University of Michigan produces circuit diagrams using GEOS. Second-graders in Tampa, Florida, use GEOS to create a class newsletter. And a kindergarten teacher used geoPublish to create a coloring book for her students.

Perhaps the largest number of entries were submitted in the newsletter category. If you need to get word out to a group of people, GEOS can help with a newsletter that addresses dental patients, investor clients, church members, Star Trek fans, jaycees, golfers, family members, scouts and, of course, user groups. Some of the newsletters were relatively plain, but the ones that caught our attention were cleverly done with multiple columns and eye-catching graphics.

A Word About the Winners

The winning entries in the seven categories that follow were chosen according to several criteria—design, graphics, layout, use of fonts, content and application.

A Canadian student created a comic book on his C-128 that rivals many of the professional comics we've seen. A freelance commercial artist designed and created birth announcements that would make any newborn proud. A professional musician keeps his band in tune with an informative, interesting and well-designed newsletter.

Perhaps the hottest contest was in the open category, which saw many interesting applications, including greeting cards, stationery, note cards, an illustrated booklet entitled "How to Build Your Own Rockets" and a social studies text used by a teacher to help deaf students. In addition to the three winners in this category, we also cited two honorable mentions, who will each receive *RUN*'s GEOS Power Pak disk for their original submissions. These two entries, along with the submissions of the first-place winners, are pictured on the following pages.

The names and hometowns of the winners in each category are listed below. The second- and third-place winners will each receive Commodore ►

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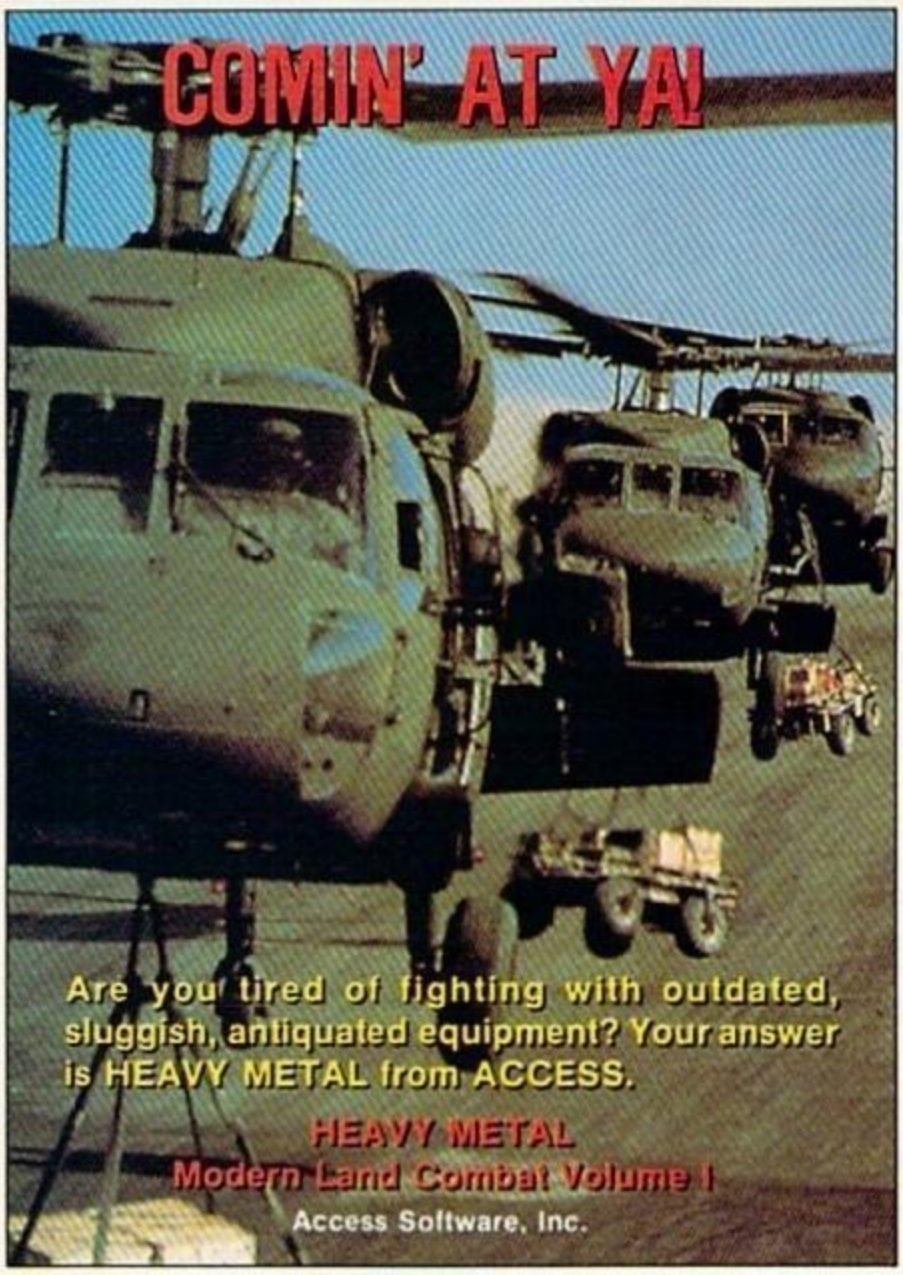
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Are you tired of fighting with outdated, sluggish, antiquated equipment? Your answer is HEAVY METAL from ACCESS.
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Modern Land Combat Volume I
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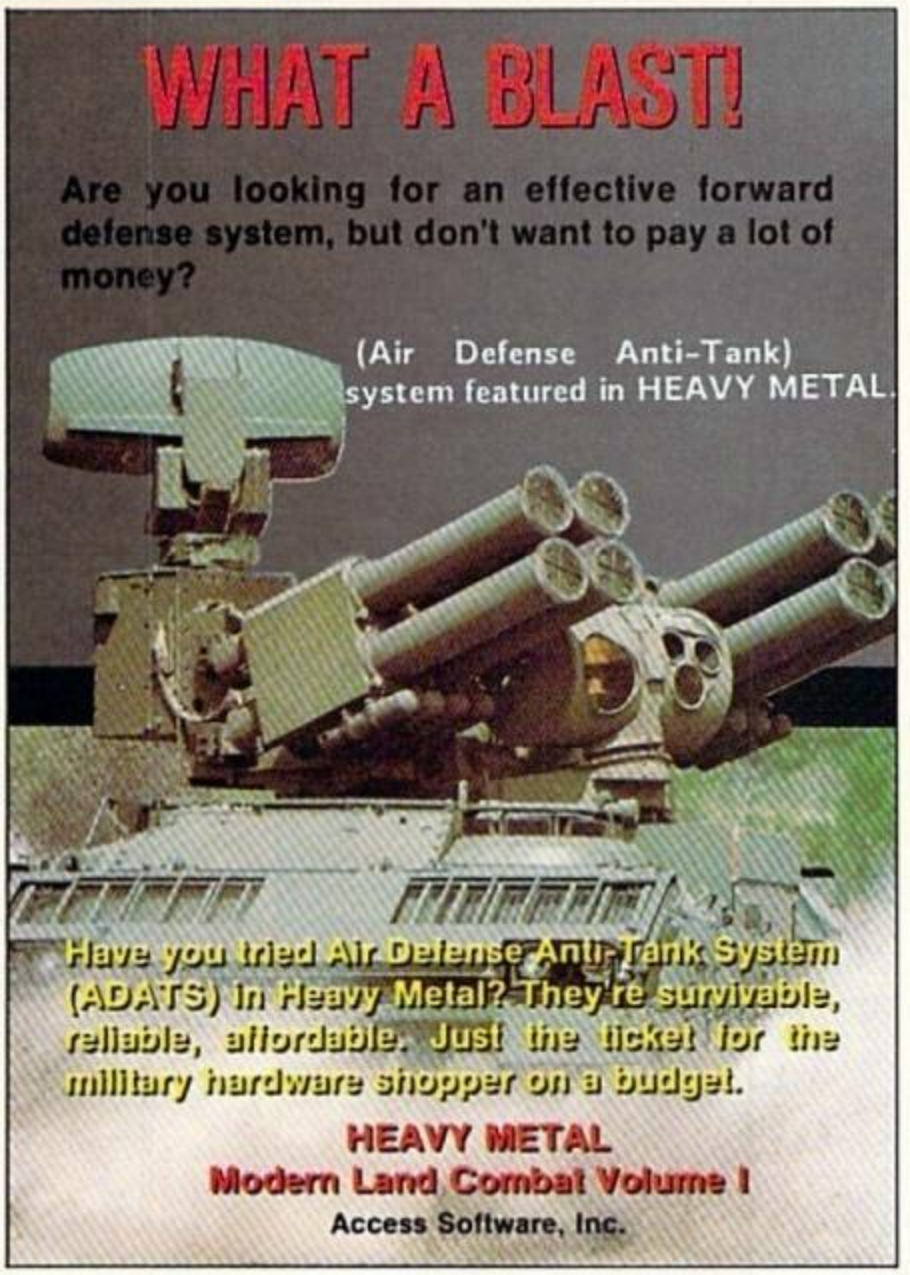
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Have you tried Air Defense Anti-Tank System (ADATS) in Heavy Metal? They're survivable, reliable, affordable. Just the ticket for the military hardware shopper on a budget.
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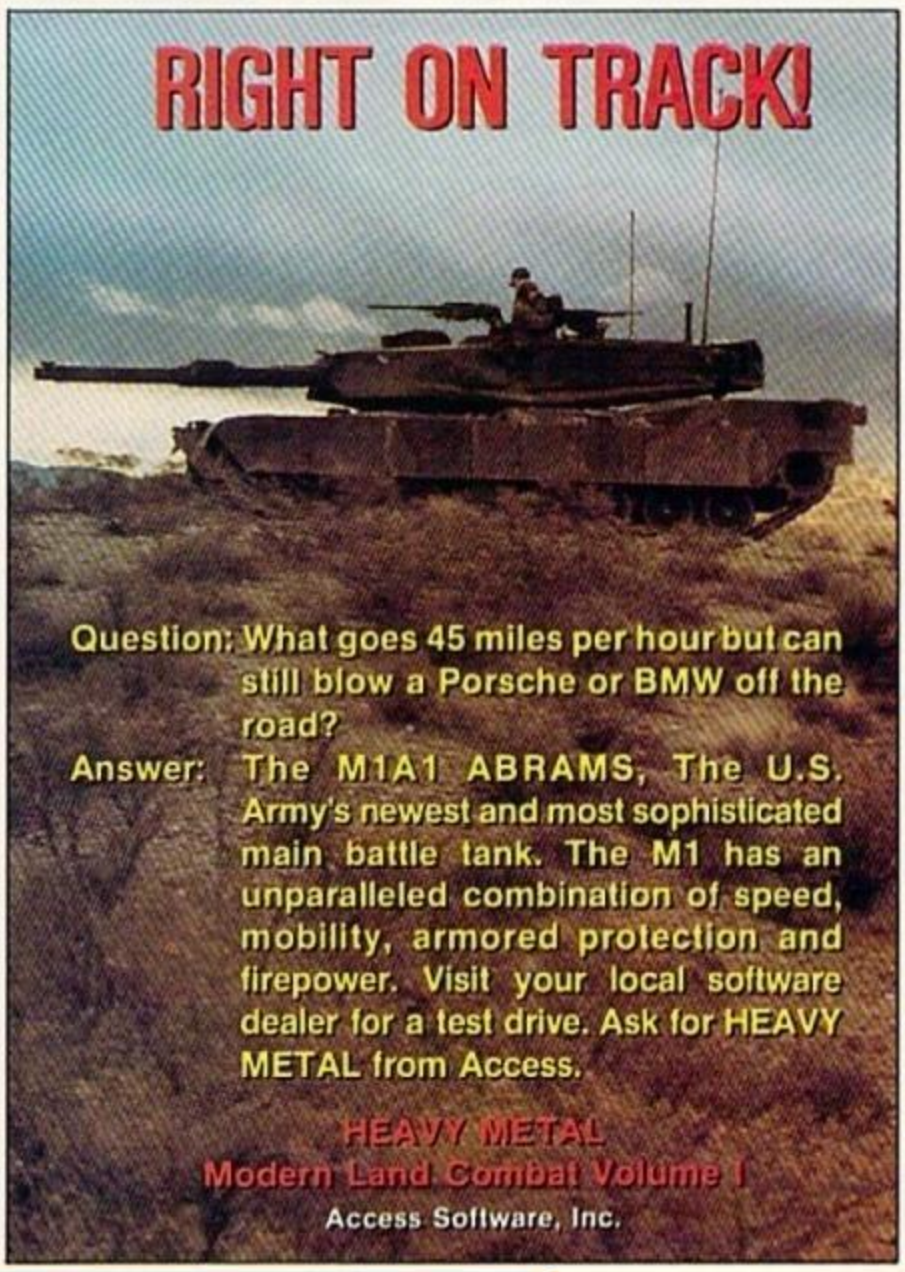
RIGHT ON TRACK!
Question: What goes 45 miles per hour but can still blow a Porsche or BMW off the road?
Answer: The M1A1 ABRAMS, The U.S. Army's newest and most sophisticated main battle tank. The M1 has an unparalleled combination of speed, mobility, armored protection and firepower. Visit your local software dealer for a test drive. Ask for HEAVY METAL from Access.
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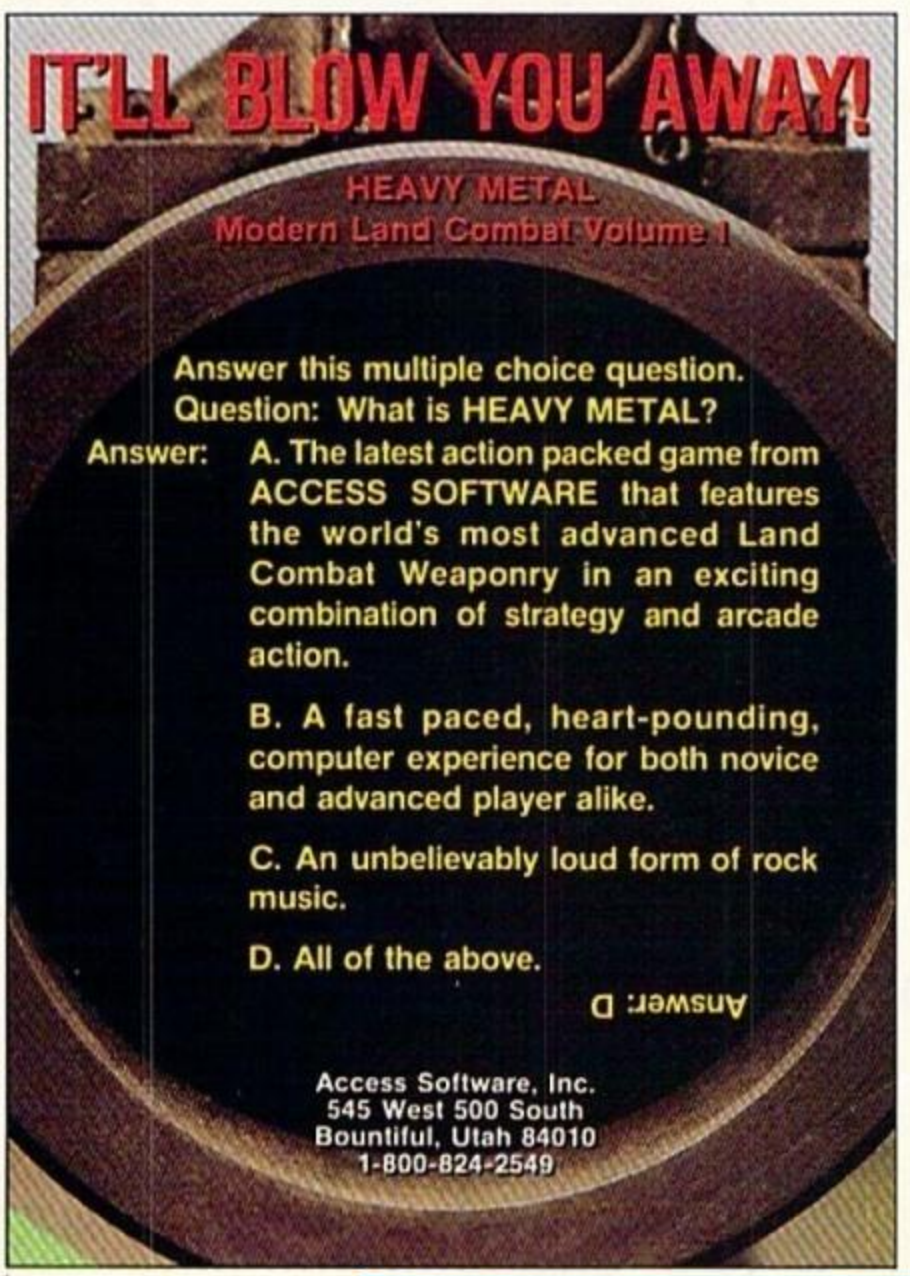
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Answer this multiple choice question.
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B. A fast paced, heart-pounding, computer experience for both novice and advanced player alike.
C. An unbelievably loud form of rock music.
D. All of the above.
Answer: D
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hardware and GEOS software, as well as time on QuantumLink and a subscription to *RUN*.

The first-place winners will receive similar prizes and, in addition, a $1000 cash prize.

Here's a look at what can be done with GEOS, just one of the desktop publishing programs available today.

Poster:

1st Place — John Mercante, Jersey City, NJ; Classic ad

2nd Place — Hillman E. Bearden, Savannah, GA; Learn-to-fly poster

Newsletter—laser:

1st Place — Steven Kroll, Scales Mound, IL; "The Discovery Dispatch," a music band newsletter

2nd Place — Shawn Nau, Columbus, OH; Annual report for Ohio Attorney General's office

3rd Place — Mike MacNaughton, Regina, Saskatchewan, Canada; Financial analysis newsletter for investors

Flyer—laser:

1st Place — Larry Feaster, Winchester, VA; Video Digitizing flyer

2nd Place — Herbert V. Andrews, Birmingham, MI, Marina flyer

3rd Place — Andrew Schuman, Londonderry, NH; Pediatrics flyer

Newsletter—dot matrix:

1st Place — Edd Sturdevant, Union City, PA; "The Youth Ticket," a church youth group newsletter

2nd Place — Terry Riley, Albuquerque, NM; "Pack 409," a cub scout newsletter

3rd Place — Michael Henderson, Cucamonga, CA; "The Look 'N Hook Line" newsletter

Flyer—dot matrix:

1st Place — Daniel O'Hara, Longueuil, Quebec, Canada; Grocery flyer

2nd Place — Jacques Caron, Sherbrooke, Quebec, Canada; Einstein illustration

3rd Place — Larry Scholte, San Diego, CA; Computer store ad

Open—dot matrix:

1st Place — Sean Huxter, St. John's, Newfoundland, Canada; Comic book

2nd Place — Frankie Ridolfi, West Bend, WI; Illustrated "How to Build Your Own Rockets"

3rd Place (tie) — Susan Lamb, Yuma, AZ; Greeting cards, stationery, note cards

3rd Place (tie) — Robert Meyer, Bloomingdale, GA; Social studies booklet

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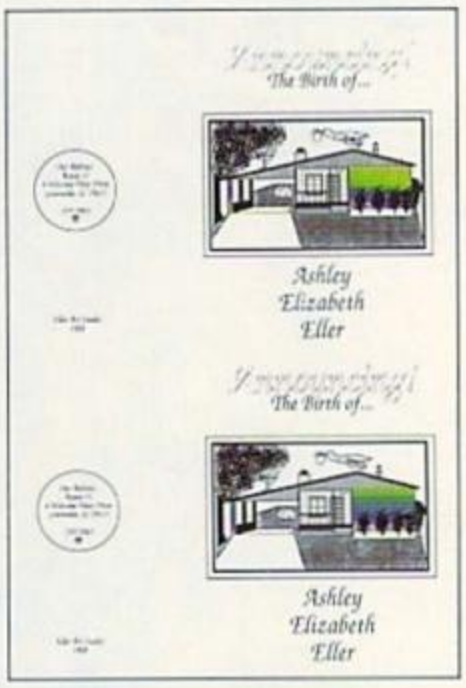
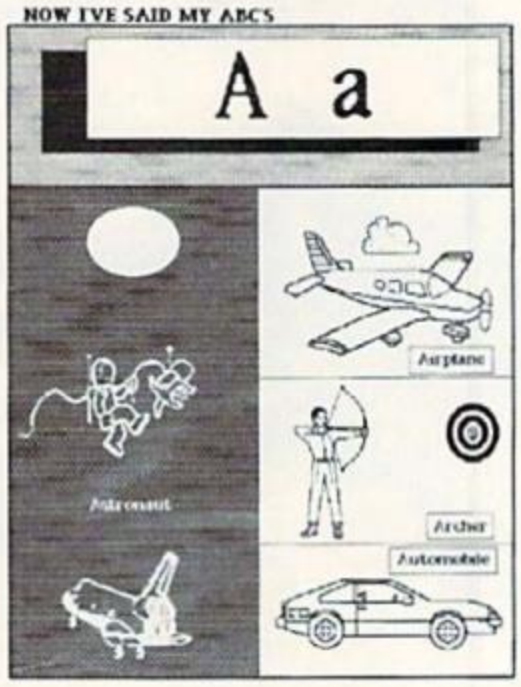
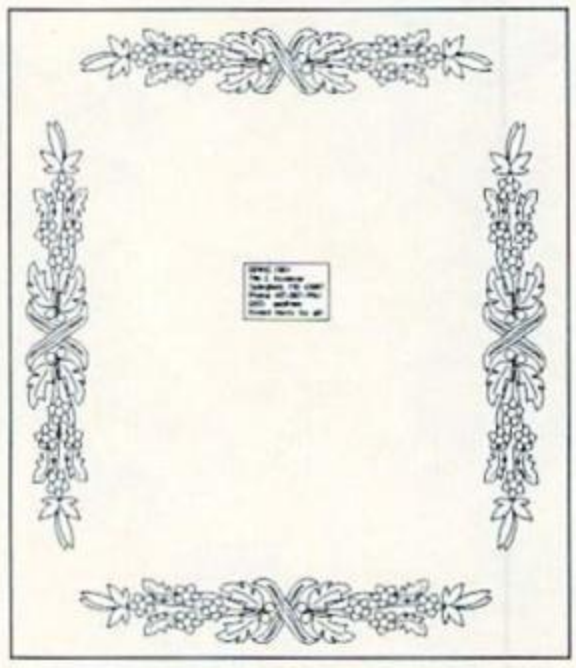


Open—laser:
1st Place — Roger Eller, Greenville, SC; Birth announcement
2nd Place — Bob Thomas, Redondo Beach, CA; Awards dinner invitations
3rd Place — Brian Twede, Salt Lake City, UT; Photo studio work order

Honorable Mention:



Bill Stanley, Vidor, TX; "Now I've Said My ABCs," a letter book



Dennis Frey, Springfield, MO; Design used on a stencil for etching on glass mirror ■

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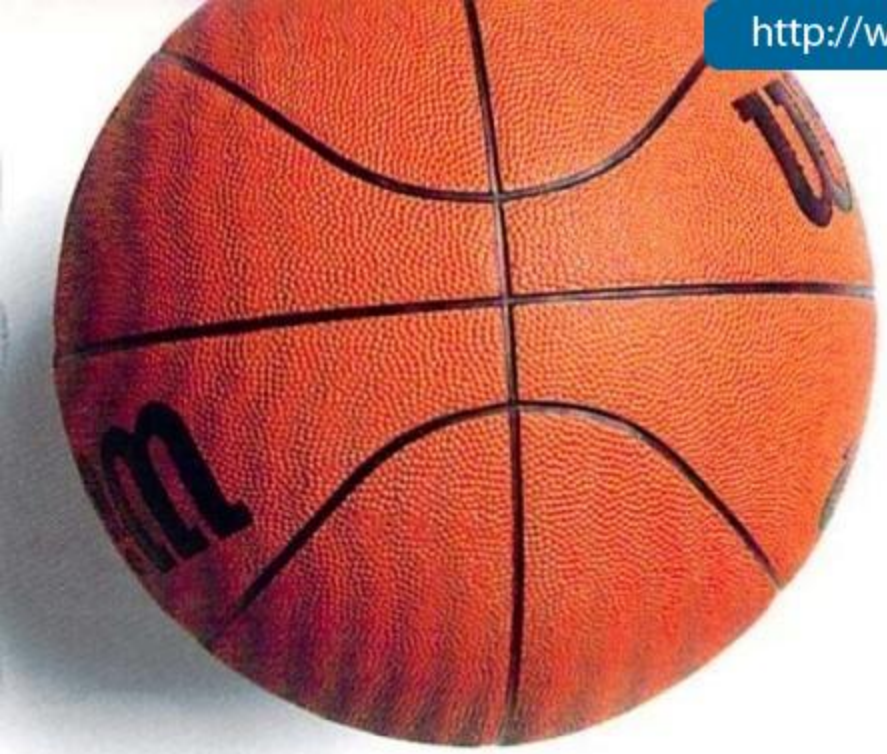

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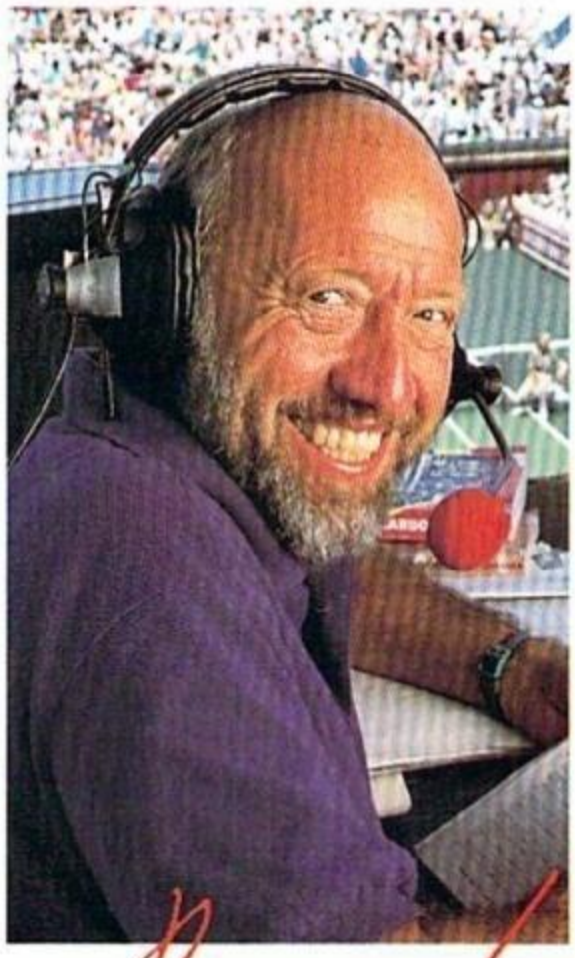

BUD COLLINS
Television tennis analyst

"What do I expect from a computer tennis game? Realism. I want to sense the power of a strong forehand, the ease of a smooth backhand. Accolade's Serve & Volley gives me that realism—and more.

"Serve & Volley truly captures the essence of the game—the action, the strategy, the pressure. You can select and place your shots via the animated "Strobe-O-Stroke" graphics. There's match or tournament play, three levels of difficulty, even three different court surfaces.

"Why should I leave the office to cover a tournament? Now I can play one on my computer with Serve & Volley."

HANK STRAM
Radio voice of NFL Monday Night Football

"I've seen some great moves on the football field but nothing compares to the moves you'll find on 4th & Inches computer football. This is real pro football action with 11 animated players per side. It's great! The ball's snapped and you have 22 guys running around the screen buttin' heads!

"But the best part about 4th & Inches? The control. I pick the starters. I control the key players on offense and defense. Heck, this is a head coach's dream come true! And the playbook? Fantastic. You get a pro style playbook with 20 plays and 11 different formations.

"Somebody at Accolade really knew their X's and O's when they drafted 4th & Inches. Great game plan, guys!"

MARV ALBERT
1988 Olympic boxing commentator

"I used to think my broadcast booth at ringside was the closest I'd ever come to the true boxing experience. Then I played T.K.O. computer boxing. Talk about "up close and personal!" T.K.O. put me right in the ring, face to face with a heavyweight champ.

"During a fight I like to do all the jawing. With T.K.O. I got to jab at a fighter's jaw. I threw a right… it landed! I could actually see those familiar signs of wear and tear on the champ's face. At the bell, the champ had a black eye, a fat lip and—I suspect—a bruised ego.

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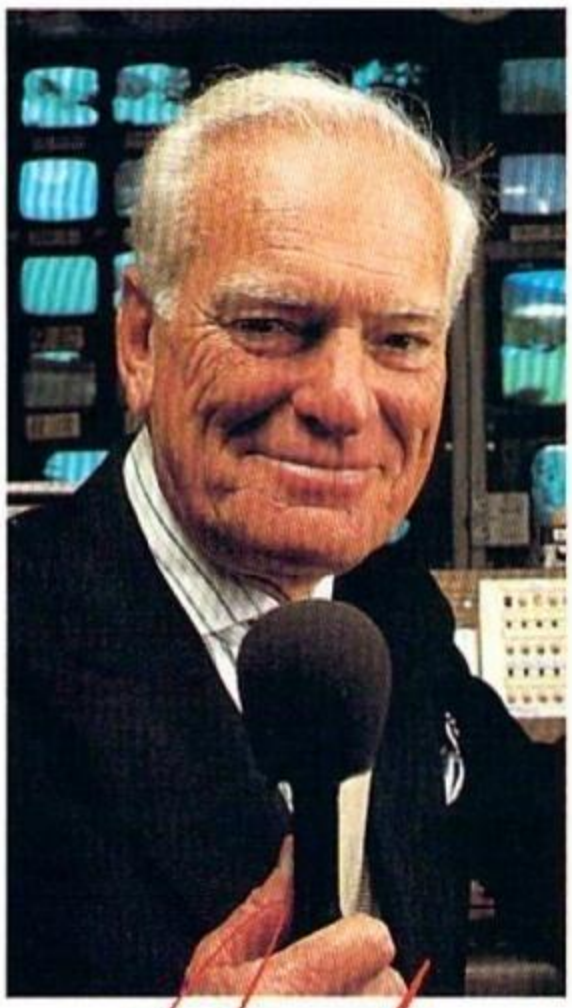

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JACK WHITAKER
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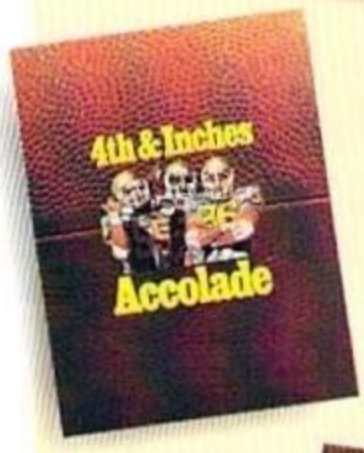

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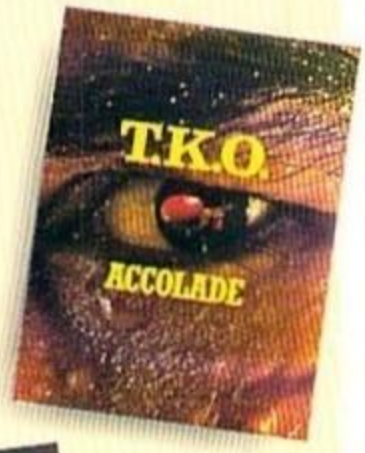

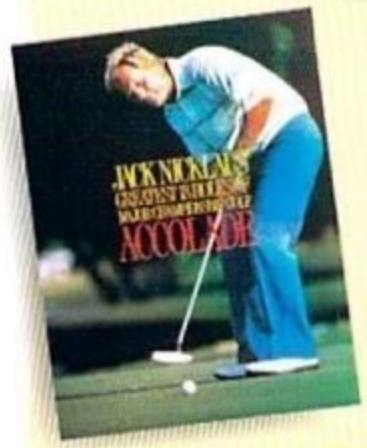

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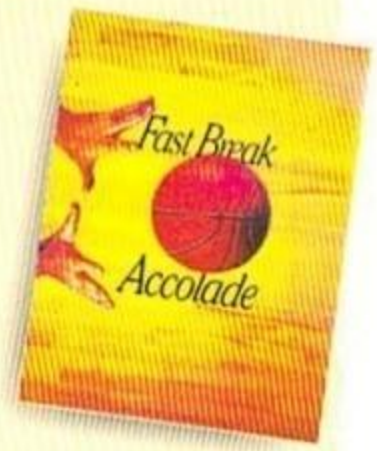

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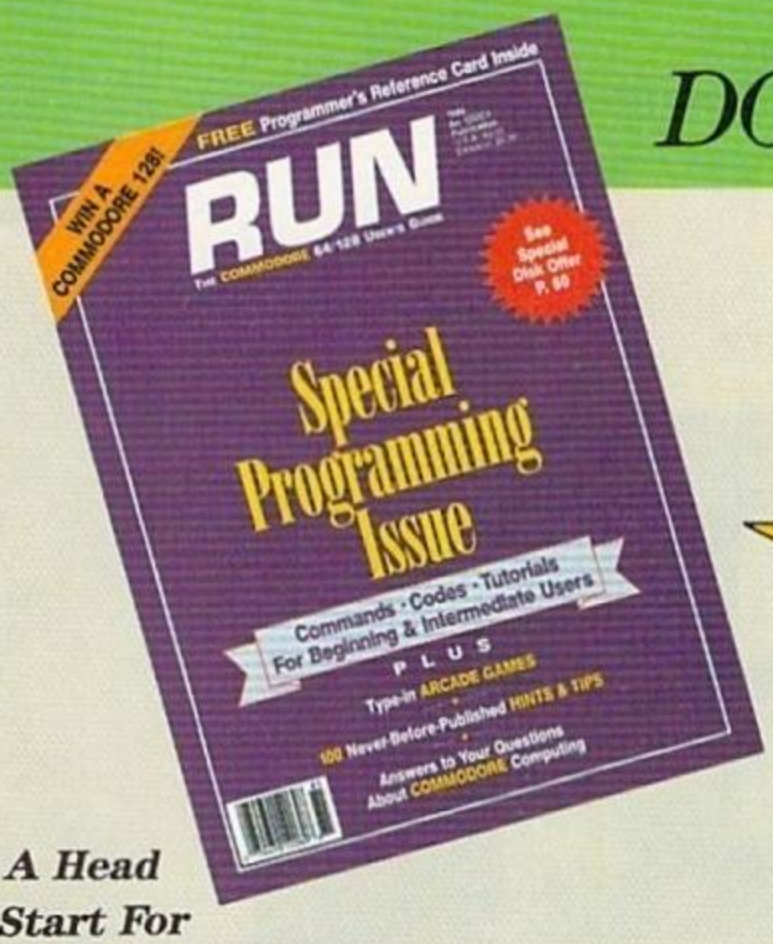
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Dear Santa . . .

Please bring me software that supports my RAM Expansion units, 1351 mouse and 1581 disk drive.

Three REU stars and their supporting cast.

By BARBARA MINTZ

Most of us enjoy a challenge, and sales figures for computer adventure games and the steady clink of quarters dropping into arcade games attest to that enjoyment. But when we plunk down a bagful of quarters for a new piece of hardware, we're looking for a device that will simplify our lives, not complicate it.

When I surveyed Commodore's new 1700, 1764 and 1750 RAM Expansion cartridges and the 1351 mouse in the November 1987 issue of *RUN*, I liked what I saw, and I'm just as enthusiastic about the newest piece of Commodore hardware, the remarkable little 1581 disk drive. They promise the kind of adventure that usually comes with a more powerful, versatile computer system; but it's important to note that, without friendly software support, all three can provide some unwelcome challenges along the way.

Fortunately, several interesting software applications were available right from the start for the RAM and the mouse. The past year hasn't brought many new programs from major publishers, but Commodore computers have always enjoyed a kind of "grass roots" support, and, one way or another, we're finding the software that makes our new hardware useful and friendly. Here's a survey of some significant programs. You'll find their sources listed in Table 1.

RAM Expansion

The RAM Expansion unit (REU), with all its extra memory (128K in the 1700, 256K in the 1764 and 512K in the 1750) has obvious advantages for Commodore computers, but, on its own, it certainly qualifies as a challenge. You can't just plug this big new cartridge into your computer and use it to run your extra-long programs. It's really designed to store code and data and move it back into the computer when needed—something like a disk drive, but so much faster, thanks to the REU's direct memory access (DMA), that you don't ever notice the move being made. Adept programmers, using that speed, can make you think you're working with a very big computer indeed.

RAMDOS

Basic 7.0, the native language of the C-128, has several commands (Stash, Swap and Fetch) that somewhat simplify access to RAM Expansion memory, but C-64 Basic offers no help at all, so it was fortunate that Commodore provided some immediate support to purchasers of the C-64's 1764 RAM expander. The RAMDOS program on the Test Demo disk distributed with the 1764 enables you to install the REU as a large, extremely fast disk drive emulator.

With RAMDOS in place, the phantom drive produces a directory with 1000 blocks of disk memory. C-128 owners didn't get a RAMDOS of their own at that time, but, if they could find a copy of the C-64 version, they could run their computer in 64 mode, use the C-128's 1750 REU and install a RAM disk with 2014 blocks of memory.

RAMDOS is an impressive piece of software, but it isn't flawless. Each time you turn on the computer, you must invest time and effort, first to load and run RAMDOS, then to transfer the programs you want to use from a real disk drive to RAM memory. Also, when you power down, the drive emulation disappears with your data, so you must carefully save important new material back to a real disk drive before it's lost forever.

It's most frustrating that many programs won't recognize the drive emulation and will return a Device Not ►

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NEW HOPE FOR BATTERED STORY GAMERS.

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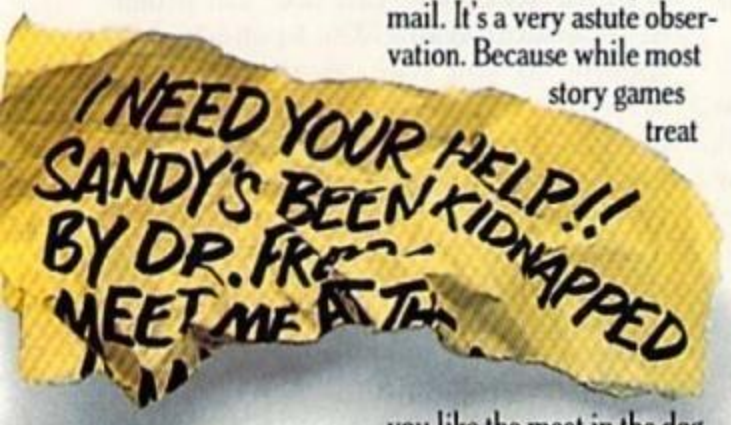

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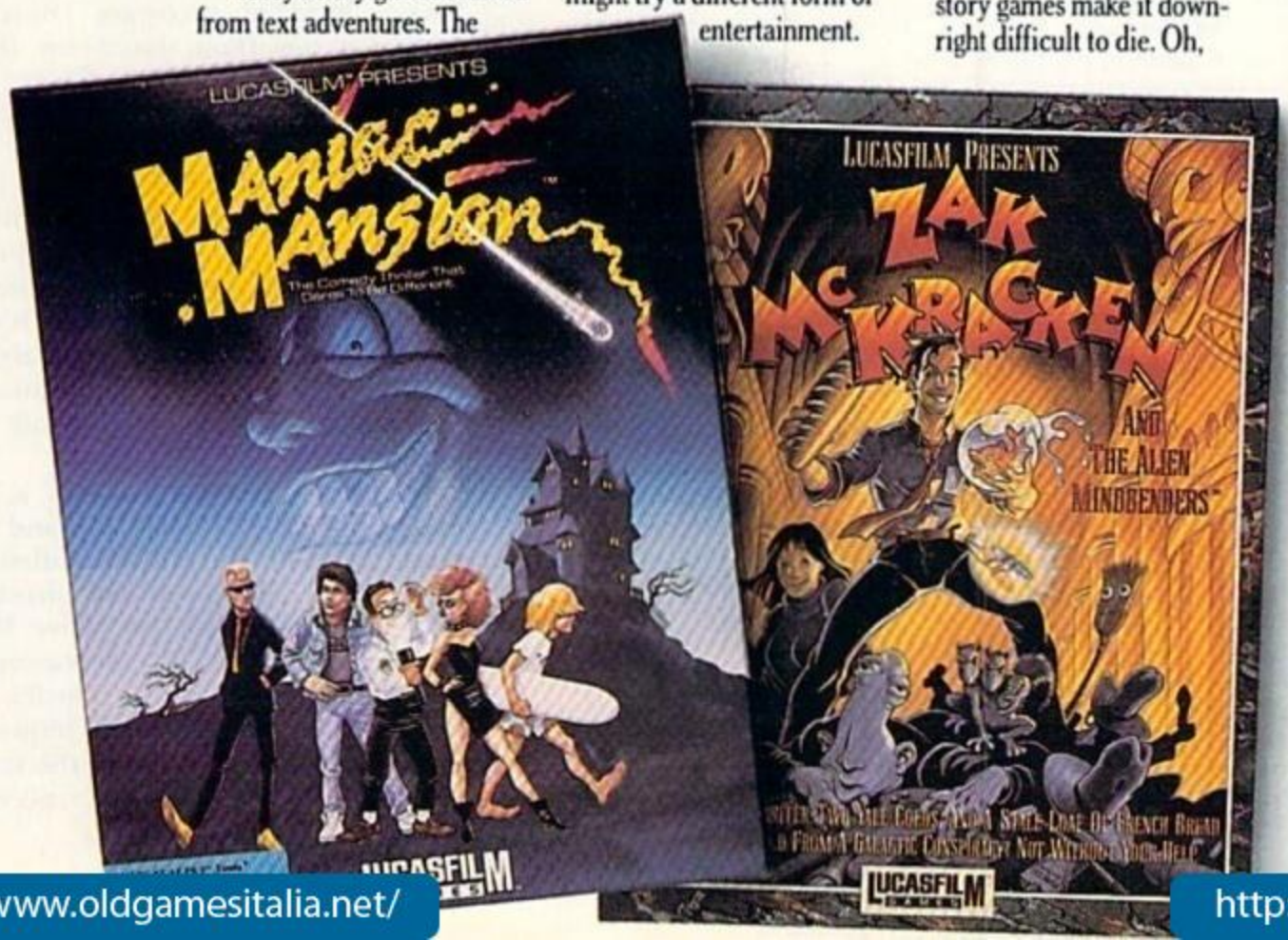

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Present error when you attempt to use it. Nevertheless, RAMDOS is an important option for those who plan to use a number of programs and a lot of data in the course of a single work session and want it all quickly available.

Since its first release a year ago, RAMDOS has been updated and improved and a version is now available for 128 mode. This C-128 RAMDOS is not included on the Demo disk distributed with the 1700 and 1750 REUs, but you can find it on most of the commercial telecom services and local bulletin boards, and it's probably in most user's group public domain libraries, as well. It's a must-have, if you own any of the RAM Expansion units.

A slightly more elaborate implementation of the drive emulation is available for C-128 users in RAMDOS 128, written in England and now distributed on this side of the Atlantic by Free Spirit Software. Among other attractive features, RAMDOS 128 provides an extension of the C-128 Copy command that simplifies the transfer of files from disk to RAM and back again, and, reassuringly, it offers a method of restoring the RAM disk after a reset. For C-128 users who use CP/M, Commodore bundles a CP/M system disk with the 1750 that enables the REU to function as a RAM disk in CP/M mode.

Productivity

Digital Solutions' Pocket series and Professional Software's Fleet System 4 were both early supporters of Commodore's RAM expansion for the C-128. Both use their own internal code to install the REU as a RAM disk, and both provide commands that simplify the transfer of data from drive to drive. You're encouraged to move the spell-checking dictionary, as well as your own text files, to the RAM drive. In both systems, the speed of the RAM disk is a notable advantage when it's used for file copying or spell-checking.

New on the scene, Electronic Arts' PaperClip III takes a slightly different approach to RAM expansion. Like Fleet System and Pocket Writer, it checks for the presence of the REU in 128 mode, but the RAM expansion isn't installed as a drive for you to access directly.

PaperClip III combines sophisticated word processing and telecommunications in the same package, so it uses a lot of memory. Normally, portions of the program (overlays) are loaded into memory from the disk drive only when they're needed, creating small delays in program execution and larger delays if disk swapping is involved. If a RAM Expansion unit is plugged into the C-128, these overlays are automatically stored in the REU when PaperClip III is first loaded, resulting in faster and smoother program performance.

PaperClip III also moves its dictionary to the REU while it's being read for the first spell-check, so subsequent dictionary reads are extremely fast. A two-paragraph document can take as much as a minute and a half to spell-check without RAM expansion; with it, the same document can be checked in under two seconds. Once the dictionary is in the REU, you can take advantage of its instant availability to check your spelling as you type, an option that I believe is unique to PaperClip III. For the insecure speller, that feature alone can be worth the price of the REU and PaperClip III.

Busy Bee Software, one of our "grass roots" publishers, has worked with user's groups, testing and retesting its word processor, The Write Stuff, and producing versions for the C-64 and C-128 that are compendiums of user wish lists. The Write Stuff is designed to be extremely flexible—as simple or as complex as you desire.

So far, this is the only word processor that lets both C-64 and C-128 users set up a RAM disk using the REU. To this end, Busy Bee instructs you on the steps needed to integrate Commodore's RAMDOS program with The Write Stuff. They also supply copies of RAMDOS and Commodore's Filecopy program on the Write Stuff disks. Finally, they show you how to make Filecopy into a kind of auto-exec copier by adding a few Data statements to the program.

Telecommunications

In the area of telecomputing, Ultraterm III, a terminal program for the C-128 published by Steve Boerner, is a product of the same kind of development displayed by Busy Bee. It's the culmination of a series of shareware versions, incorporating a multitude of features that users have found most valuable.

Ultraterm uses the REU as a RAM disk, which is extremely fast and commodious. With the REU installed, you can upload and download directly to and from RAM disk, or "drive M," as Ultraterm III calls it, increasing the speed and safety of the file transfer. With drive M in use, it's practically impossible to run out of disk space in the middle of a download, and it's never necessary ►

Table 1. Distributors.

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Basement Boys Software
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Portland, OR 97230

Berkeley Softworks
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Berkeley, CA 94704

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Free Spirit Software
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Electronic Arts
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San Diego, CA 92123

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Patech Software
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Rainbird, distributed by Mediagenic
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to waste precious online time moving the contents of the buffer to disk. When you're ready to transfer files between disk drives, Ultraterm III provides the necessary utilities.

Prototerm, distributed by Briwall, also supports Commodore RAM expansion, as does the VT100 emulator created by Commodore for the Test Demo disk that's distributed with the new 1670 modem. So, telecom enthusiasts will find at least three terminal programs currently available that make use of Commodore's new technology.

GRAPHICS

Several graphics-oriented programs have also taken advantage of the REU's remarkable speed and capacity. Micro Aided Designs' T.H.I.S., which is described as a drawing and design system for the C-128, won't even boot up unless RAM expansion is installed. Since I described the program last year, it has acquired a new format that lets you divide a picture into as many as nine sections, each the equivalent of one monitor screen, and then scroll from section to section. With the 1750's 512K, you can store as many as six pictures in memory simultaneously and still maintain a library of symbols. The 1700, with 128K of RAM, will support only one nine-section picture and doesn't accommodate the library feature.

Neither Patech Software's Basic 8.0, the remarkable graphics programming environment for the C-128, nor Berkeley Softworks' GEOS, with its many applications for the C-64 and C-128, require a RAM Expansion unit, but both can make excellent use of the REU, scrolling screens of hi-res graphics with speed and grace.

Basic 8.0, which enables the C-128 user to produce incredible hi-res color graphics in 80-Column mode, uses the REU to store program data in user-definable buffers. A tremendous variety of graphics "structures," Basic 8.0's term for the building blocks from which it creates displays, can be stored in the REU, enabling rich, swift graphics effects.

In the absence of an REU, the same structures can be stored on disk and switched in and out of buffers in computer memory as required. Basic Paint, the elaborate 80-column color paint program that Basic 8.0 supplies as a demo, lets you indicate the amount of RAM expansion memory available in your system and takes care of the rest of the details automatically.

GEOS gives you the option of installing the REU either as a RAM disk, which you can control directly as a work disk, or as a "shadow drive." In the latter mode, it holds copies of programs and data that have been loaded into the computer, so subsequent calls for the same material will be much faster—a variation of the "overlay" method.

THE 1351 MOUSE

Basic 8.0 and GEOS both support a variety of input devices, but they're at their best with Commodore's 1351 mouse, Even T.H.I.S., originally designed exclusively for lightpen input, has a mouse driver in its new version, attesting to the mouse's growing popularity.

Windows, pop-down menus and direct graphics manipulations are all well suited to this comfortable little device. The mouse can't compete with the joystick as a game controller, even when it's in Joystick mode; but, then, drawing with a joystick is a bit like scratching pictures on a sidewalk with a stick. A lightpen is a fine graphics tool if your monitor is within easy reach, but lightpens are relatively expensive and can be awkward and tiring to hold. The mouse—unambiguous, responsive and fluid, its speed and direction directly resulting from the movement of your hand—is proving useful in a number of applications.

Abacus provided a mouse update for their CADPAK program last year. Home Designer, distributed by Briwall, is a computer-aided design program for the C-128 that uses mouse input. And Inkwell's Flexidraw, the classic lightpen drawing package, now supports the mouse in version 5.5.

If you're enthusiastic about Rainbird's Advanced OCP Art Studio (distributed by Mediagenic) and don't have the English mouse that the program supports, you might like to experiment with Commodore's 1351 in Joystick mode. It works surprisingly well, making this one of the few 1351 applications in which this mode is appropriate.

In another of those "grass roots" developments, Peter and Paul Hughes, graphics SYSOPs on Q-Link, report that Artist 64, a popular English graphics program from Wigmore House, Ltd., now has a 1351 mouse driver. It's available not from Artist 64's publisher, but from a user who wanted a mouse driver, wrote it himself and uploaded it to Q-Link to share with the rest of us. Either download Art1351patch or get more information online. The driver is easy to install and seems to work flawlessly.

PaperClip Publisher, the new C-64 desktop publishing program from Electronic Arts, doesn't support RAM expansion, but it does make use of the 1351 mouse. You select from menus and icon tool displays by moving a set of cross hairs to your choice and clicking a mouse button. The system feels pleasant and natural and affords a degree of security that's missing when keyboard commands are used. An incorrect keyboard command can waste a lot of time in a program that manipulates so much text.

Look at all the power a little mouse can command.

THE 1581 DISK DRIVE

PaperClip Publisher and PaperClip III exhibit a common feature that's important with Commodore's new 1581 ►

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disk drive: In accordance with Electronic Arts' welcome new policy they call "creativity software," neither program is copy-protected.

Copy-protection is an issue that's going to become increasingly important as more users invest in the 1581, for they're almost surely going to want to use the 3160 blocks available on its 3½-inch disk to compact their program collections—and that means a lot of disk copying.

Public domain programs and those that you type in won't present much of a problem, but protected disks will. You'll never be able to use the nibble method to make an exact copy of a 5¼-inch floppy on the 1581's 3½-inch disk; the formats are just too different. Be grateful to those publishers who simplify the transfer to the new format—and don't abuse their generosity.

PaperClip III and PaperClip Publisher, The Write Stuff, Basic 8.0 and Ultraterm III all let you back up your program disk, and, by extension, copy your program to 1581-format disks. Ultraterm III and the C-128 version of The Write Stuff also support the 1581 partition commands, and Ultraterm III actually provides utilities for transferring programs from one drive to another, so you can use its own commands to create a 1581 version. Other programs, like Xetec's Fontmaster 128, which depend on a dongle for protection, can be copied to and run from a 1581 disk, and several publishers of protected software are making 1581 format backups available to owners for a small charge.

Unprotected software is doubly welcome for 1581 drive owners.

Abacus charges registered owners $10 for 3½-inch backups and accepts original disks in exchange for the following programs: Basic 64, BeckerBasic, CADPAK 64, ChartPak 64, Super C 64, Basic 128, CADPAK 128, ChartPak 128, Cobol 128 and Super C 128. S.O.G.W.A.P makes the Big Blue Reader available in 3½-inch format, and Professional Software provides 3½-inch backups of Fleet System 2+ and Fleet System 4, their word processor/file system packages for the C-64 and C-128. There's a $10 charge for the extra 3½-inch disk at the time of purchase or a $15 charge if it's bought as a backup at a later date.

If you're thinking about translating your entire library into 1581 format, remember that, while the 1581 is very fast in 128 mode, it isn't much faster than a 1541 when used with a C-64 and not a lot faster than a 1571 in 128 mode. Some programs are vastly improved by

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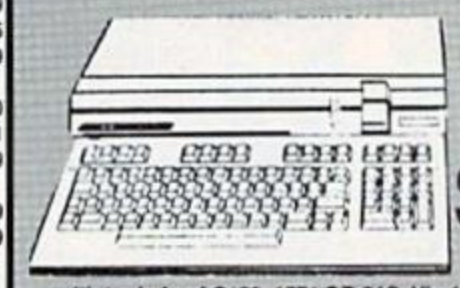

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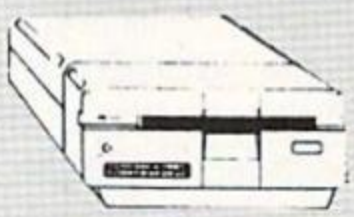

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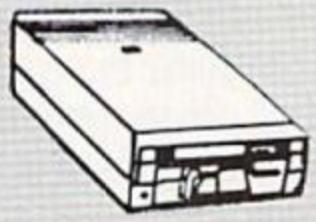

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the new format, some are not.

Fleet System 4 is definitely well suited to the 1581. In its 5¼-inch format, there's one disk for the word processor, one for the 90,000-word dictionary and a third for the thesaurus. That means a lot of disk swapping each time you use the package's special features. However, with all the program sections on one 1581 disk, access to the thesaurus and dictionary is immediate, making them much more practical tools. Of course, it's equally nice to have everything in RAM expansion, which is also possible with Fleet System 4, but that takes a little longer to set up each time you use the program.

Partitioning Considerations

Time and the 1581's rather complicated system for partitioning disks are also major issues in transferring files. Free Spirit's Super 81 Utilities for the C-128 and C-64 helps a bit with the partition problem, guiding you gently through the process of creating and opening partitions. Unfortunately, you still have to decide where your partitions will begin and end. For additional help, you could exit Super 81 and run Commodore's Show BAM utility from your 1581 Test Demo disk to find out which tracks and sectors are still available.

Super 81 also provides file-copy and disk-copy utilities, a sector editor and, in the C-128 version, a drive monitor. Super 81 Utilities will probably make you a little more comfortable while you experiment with your new 1581 drive, but if you have more than two drives, you may have to disconnect one to use it, and the copying process is slow and not always successful.

When you're in a hurry, you might want to use Super Snapshot, V3 (distributed by Software Support International), which has a file-copy utility that works very nicely with the combination of a C-64, 1581 and Super Snapshot's fast-load utility. Super Snapshot's Turbodos is also effective with the 1581 drive. That may be equally true of other C-64 DOS speedup utilities, but don't count on it until you try them out.

If you can use 80-Column mode with your C-128, Fast Hack'Em, V.6.0 from Basement Boys Software, is a tremendous help for transferring files between 1571 and 1581 drives. At first glance, its one menu section devoted to the 1581 promises very little beyond a convenient fast format and a nice drive monitor for the adventurous. On close examination, however, it turns out that the module for two 1571 drives can also handle the 1581 in File-Copy mode. When I tried it, it copied the entire contents of its own 5¼-inch disk to a 1581 disk, one file at a time, in 40 seconds. Not bad.

In addition to the software I've already mentioned, there are many public domain utilities and shareware programs designed to take advantage of the opportunities offered by Commodore's new hardware products. ■

Barbara Mintz is a director of the Boston Computer Society's Commodore user's group and director of software development for Brown Boxes, Inc.

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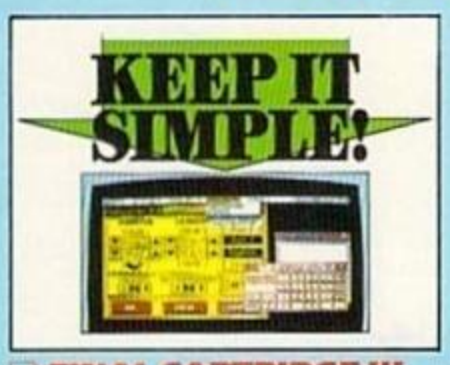

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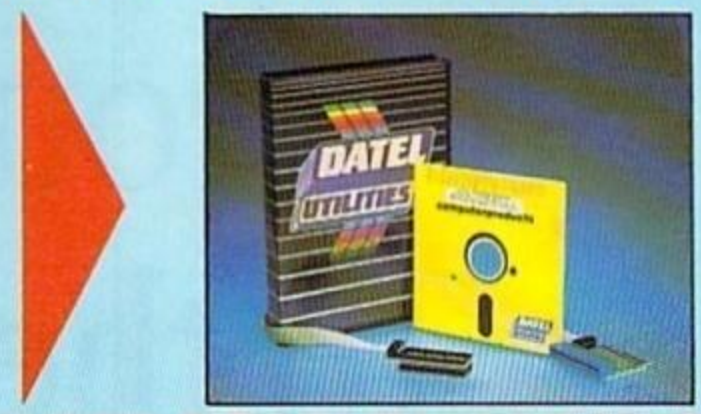

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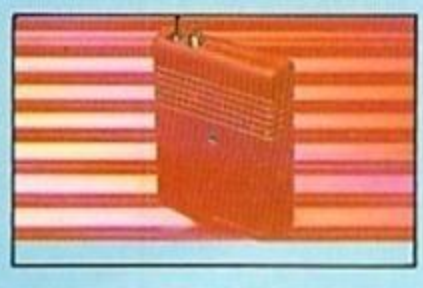

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Journey To the Center Of Your Commodore

Hop aboard for a chip-by-chip guided tour inside your computer.

Ever wonder how your C-64 or C-128 works? Like what goes on inside while you're pushing keys and watching the output on the screen? Well, a computer doesn't operate by magic, as some may feel, but by a carefully laid-out matrix of electronic gadgetry, linked by thin traces of copper on a fiberglass board, called the motherboard. These components are the processing plants, storage units and regulatory agencies that enable the computer to function.

Opening your computer out of curiosity is, however, an unwise move. It can void your warranty, and if you did something wrong, you could damage your trusty machine. If you're interested in what's inside, you can avoid those dangers by joining me on the *RUN* magazine C-64 and C-128 Guided Tour. Step right up, folks, and take your seats. The tour is about to begin!

The C-64 Landmarks

Shrink yourself down in imagination and enter the C-64, and I'll describe the landmarks that come into view. Please refer to your tour map (the photo of the 64's motherboard that accompanies this article) and follow along. From within the C-64, across the back (or northern) boundary, we have an inside view of the ports: from west to east, the user port, cassette port, serial port and audio-video plug. Further to the east lie the RF modulator output (TV port) and the cartridge expansion port.

The user port connects to external, or peripheral, devices such as a printer, modem, or even a second computer. The next outlet, the cassette port expansion slot, enables a cassette recorder to be used as a data storage device. Small voltages supplied here are also sometimes used to power external devices, such as a printer interface.

East of the cassette port, the serial port connects to peripherals such as a disk drive or a Commodore-compatible serial printer. The round audio-video outlet, next in line, connects the video and sound to a monitor, while the radio frequency (RF) modulator, immediately adjacent, takes the signals from the video chip and transmits them to either channel 3 or 4 on your TV. The RF modulator is enclosed in a metal case near the northeast corner of the printed board. The case is a shield to keep the video signals from being transmitted outward and interfering with the operation of the C-64 or other electronic appliances in the area.

Last in the line is the cartridge expansion port, which lets cartridges communicate directly with the microprocessor. (When the C-64 is turned on, the program in the cartridge is executed immediately.) The silver cover over this port is a shield designed to prevent stray electrical signals from interfering with the slot. ►

By ELLEN RULE

ILLUSTRATED BY KERRY GAVIN

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To the east of the RF modulator are power supply components, including the power input plug, the on/off switch and the fuse. Then, at the northeast edge of the motherboard is the receptacle for the power supply, which transforms the electricity in your house or office to the voltages necessary to make your computer system function properly. Since excessive current coming in could damage the circuit board, the fuse, south of the cartridge port, is provided for protection. At the eastern edge of the board, next to the power jack and the on/off switch are joystick ports 1 and 2. A multitude of devices may be connected here, including joysticks, game paddles, a light pen, a mouse or a graphics tablet, to name a few.

The Buses

Linking the various components on the motherboard are parallel lines, or traces, called buses. A bus is like a communications line over which the processing unit shares control signals, addresses and data with the rest of the Commodore system. Each trace on each bus carries about five volts in the "on" state, and zero voltage in the "off" condition.

The C-64 has three buses in its design: a data bus, an address bus and a control bus. Together, they're called the system bus. Data flow is controlled by signals, directed to the control bus by the microprocessor, that activate or deactivate certain parts of the circuitry. The processor calls to different locations, or addresses, in the computer's memory through the largest bus, appropriately called the address bus. Then it sends and receives information to and from those addresses over the data bus. In this way, the processing unit communicates with the cartridge port, peripherals like disk drives and the "real" world (motors, lights, sensors, and so on).

The Chips

The intelligence of the computer resides in the integrated circuits, or ICs. There are 32 of these centipede-like chips in the C-64: the microprocessing unit (MPU), two complex interface adaptors (CIAs), the video interface chip (VIC), the sound interface chip (SID), the programmed logic array (PLA), three ROM (read-only memory) chips, color RAM (random access memory) and eight storage RAMs, plus 14 other chips that support and interface with the larger chips.

The CIA Chips

Our tour of the ICs will begin at the northwest corner of the motherboard. Here we find two 40-pin 6526 CIAs. (Numbers such as 6526 are inscribed on the surface of the chip for identification.) The 6526 chip is a peripheral interface device, which means that it enables the computer to talk to the outside world through equipment such as the keyboard, disk drives, joysticks, a modem, a printer, and so forth.

The two CIAs are identical, but are used for different purposes. The western-most CIA is connected by a plug and a bundle of wires to the keyboard, and also to the joystick input plugs. When a key is struck or a joystick is moved, the signal is transferred to the CIA, which then places the signal on the eight copper traces of the data bus for transport to the microprocessor.

The second CIA is connected by the data bus to both the nearby user port and the serial port. Whereas the first CIA is used as an input device only, the second both transmits and receives data from a large number of peripheral devices through these two ports.

The ROM Chips

Next on our tour, traveling east from the CIAs, are three 24-pin read only memory, or ROM, chips. Information is stored permanently in these chips, so they can't accept new data and normally can't be erased; they can only send data on to the microprocessing unit when they're addressed.

The C-64's configuration can actually handle four ROM chips: the three that are built in and the ROM chip in any cartridge that may be plugged into the expansion port. The ROM chips hold programs of instructions that make your computer start up each time you switch the power on, display colors and characters, let you write your own program code, and so on. Information storage within the computer is measured in bytes, or sometimes kilobytes (1024 bytes), and the C-64's three built-in ROM chips hold a total of 20K, or 20 kilobytes, of read-only memory.

The first ROM we come to is the 8K Basic ROM. All of the Commodore Basic language, version 2.0, is stored here. Now, computer chips understand only high and low voltages, which mean on and off. Machine language programmers control the computer by directly manipulating these on/off states, a skill that involves an understanding of, among other things, binary and hexadecimal numbering systems.

Most of us don't want to go through all that trouble to program our computer, so higher-level computer languages have been developed to assist us. The high-level language that's built into the C-64 is Basic, which stands for Beginners' All-purpose Symbolic Instruction Code. The Basic ROM chip houses machine language routines that read and interpret Basic instructions and then convert them to machine language code that can be acted on by the microprocessor.

The 8K Kernal ROM, found to the east of the Basic ROM, is the chip that stores the operating system of the C-64—that is, the machine language routines that perform many of the computer's fundamental tasks. When you turn on the power, the Kernal ROM takes over and controls all the input, output and memory management of the computer.

The Kernal ROM lets you control and communicate with your machine from the keyboard and instructs the screen editor in tasks such as cursor movement. It also controls the jiffy clock for internal timing functions, as well as most of the I/O (input/output) operations, such as saving and loading programs. The Kernal works with the Basic ROM by sharing its special load, store and verify routines with the Basic interpreter.

Moving east again, we come to the third ROM chip, the 4K character ROM. This chip, sometimes numbered 2332A, contains the shapes of all 512 characters (two character sets) that can be displayed on the C-64's screen.

The 6510 Microprocessor

Our next stop, midway across the board, is the 40-pin 6510 central pro- ►

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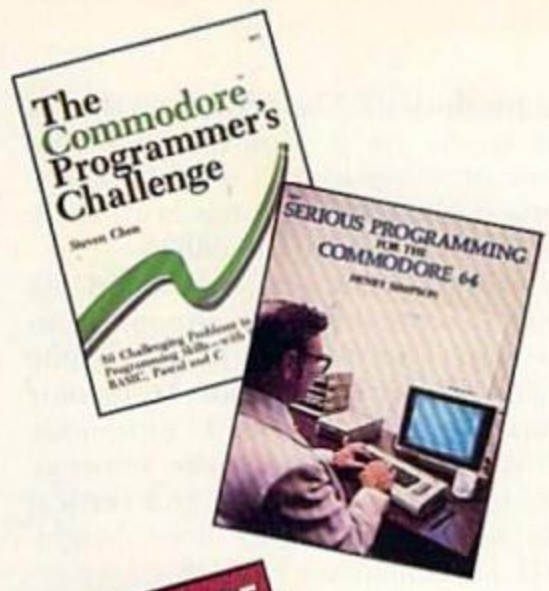

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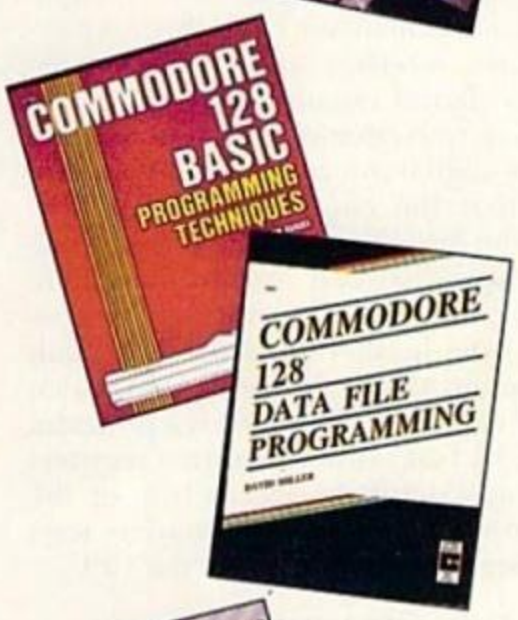

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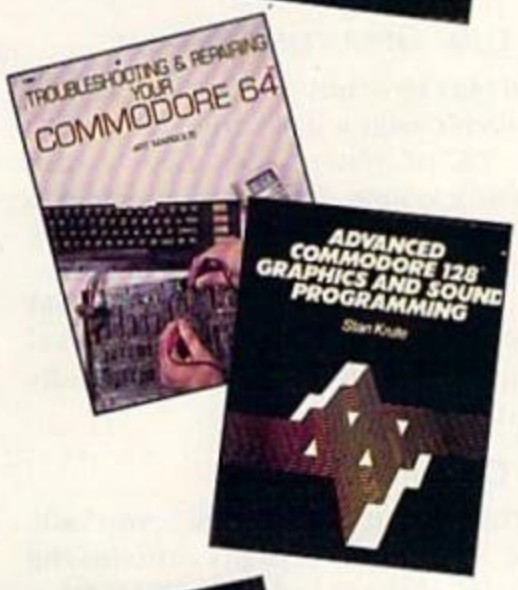

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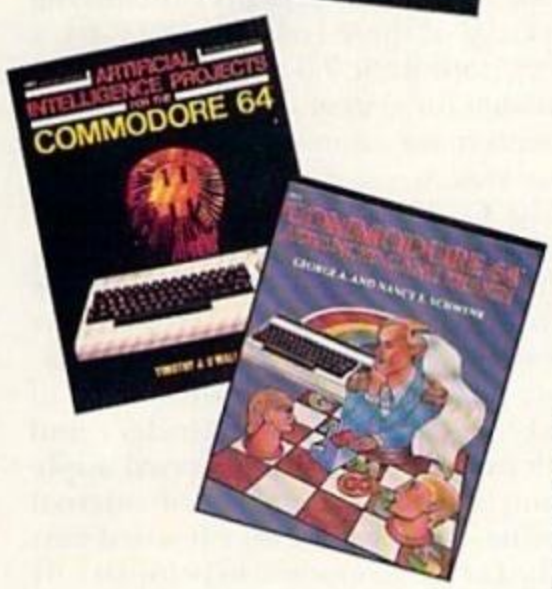

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As the warehouse for the CPU, RAM is where programs and data are temporarily stored.

cessing unit (CPU). This chip is a descendant of the 6502 chip found in the old VIC-20 computer. As the "brain" of the C-64, it controls and organizes most of the activities of the computer and processes all the machine language commands.

The CPU is the heart of the computer in that it's connected by the system bus to the other major ICs. All of the memory addresses within the other chips connect to the CPU through the copper traces of the address bus, and each address can be accessed individually. A listing of the addresses and the information stored at each is called a memory map, and you'll find one in both the C-128 and C-64 programming guides.

The PLA Chip

Moving eastward again, we see the RF modulator looming ahead. In its shadow lies the 28-pin 82S100 programmable logic array (PLA) chip. This device, often dubbed PAL, is custom-designed to produce signals that activate certain parts of the circuitry. A "traffic manager," it performs a decoding function that directs system requests to the proper chips. The PLA turns off internal memory when a cartridge is plugged in and turns the 6510 off at intervals to let the video chip generate the TV picture. It also determines which banks of memory are active, controls the order in which they come on and distinguishes between read and write operations.

The SID

Turning now and heading south to the center of the motherboard, we find the 6581 sound interface device (SID), a 28-pin chip that composes the audio signal that the C-64 sends out to your monitor or TV speaker. Originally used in arcade or home video games as a sound-effects synthesizer, the SID produces three-channel sound effects, music and even voice emulation, providing control of frequency (pitch), tone color and volume for each voice. A seldom-used feature of the SID is its ability to receive audio input and process it along with its own sounds. When the C-64 was first introduced, the SID was one of the most advanced computer music and sound effects chips around, and even today it's still one of the best.

The 6581 SID also houses a built-in device called an analog-to-digital converter, which translates the 0- or 5-volt signal from the game paddle inputs to a corresponding digital signal that the computer can understand. It's used with both game paddles and the 1351 mouse.

The RAM Chips

As the warehouse for the CPU, RAM is where programs and data are temporarily stored. The difference between ROM and RAM is that you can't erase or write over data stored in ROM as you can that stored in RAM. Also, unlike the permanently encoded ROM chips, the contents of RAM are lost when you shut off the computer, since it's the power that keeps the RAM chips active. That's why you should store your programs or data to disk at frequent intervals; any power failure will erase anything you have in RAM.

Looking over to the west, you'll see eight 16-pin RAM ICs, arranged in two lines of four and providing 64K (kilobytes) of on-board read/write memory. There are different ways to configure the use of this warehouse space, but in a "normal" situation, approximately 40K is available for programming, the Kernal and Basic each utilize 8K, and 8K is set aside for graphics, sound, machine language programs and other special uses.

The 6567 Video Interface Controller

Look now to the east to see the 40-pin custom device known as the VIC II (covered by a silver shield in older C-64s). This is the 6567 multipurpose color video interface chip, which interacts with the Commodore's memory and data to control the display screen and produce the characters and shapes that appear on it. (Sometimes, in the dozen or so versions of the C-64 motherboard, the 6566 chip has been used, but most C-64s have the 6567.)

Sprite graphics, text colors and the ability to scroll the screen all come from this chip, and the VIC is responsible for Character Display mode, Multicolor Character mode, Extended Color mode and the Bitmap mode. Video information, including horizontal and vertical sync and the luminance level (brightness), also emanates from this device.

As the interface, or interpreter, between digital circuits and the analog video output circuits, the VIC assembles bits of digital information (the ons and offs that the computer understands) into the analog composite color signal. This signal is then sent to the audio-video connector at the northern boundary of the motherboard. Used in both computer video terminals and video game machines, the VIC II is a powerful chip. In fact, with 47 control registers and the ability to access 16K of the machine's memory, it can in some ways operate without help from the CPU.

The Disk Operating System

You may have noticed that in our tour we haven't seen a disk drive controller chip. A C-64 system does have a disk operating system (DOS), which lets you read and write disk-stored information, format and copy disks, and catalog files, but it's permanently stored in a ROM inside the 1541 drive. When you access the drive, the computer automatically activates the DOS.

The Commodore 128

"What about the C-128?" you ask. This C-64 upgrade actually contains the workings of three computers: a C-64, a C-128 (with Basic 7.0 and 128K of RAM available for system use) and a Z-80 coprocessor for running the CP/M operating system.

The C-128 can use larger and more sophisticated cartridges than the C-64, and the operating system surveys the cartridge port on power-up to detect the presence of a cartridge and determine its type. The C-128 also is free to bank (switch) between cartridges and built-in ROM. Thus, an external application can take advantage of internal routines and become an extended part of the C-128, as opposed to being strictly a replacement, as we're used to seeing on the C-64.

The C-128 video interface hardware can connect to a television or monitor. In addition to audio, the output includes either composite video or separated chroma and luminance/sync signals, as found in later model C-64's. ►

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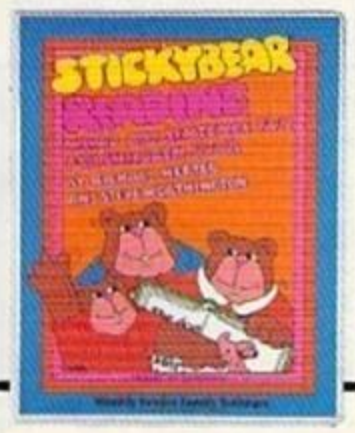

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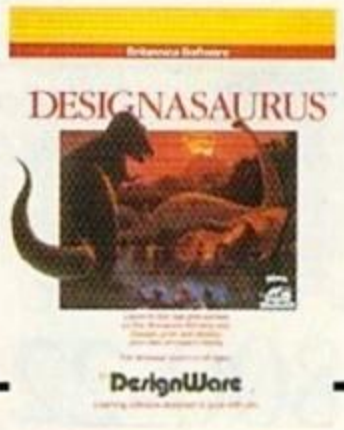

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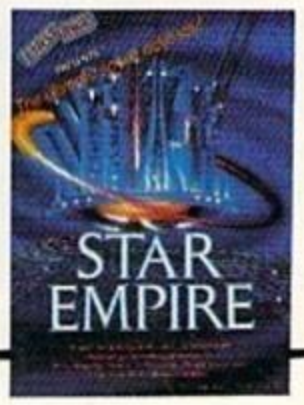

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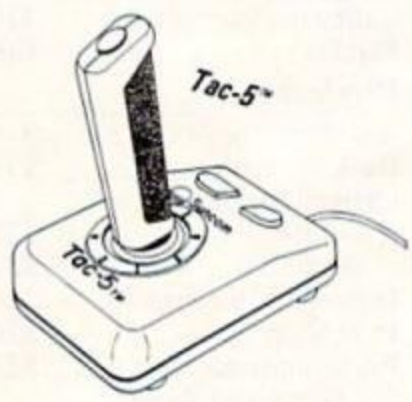

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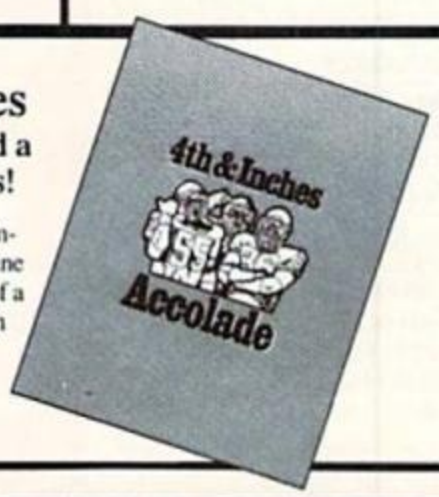

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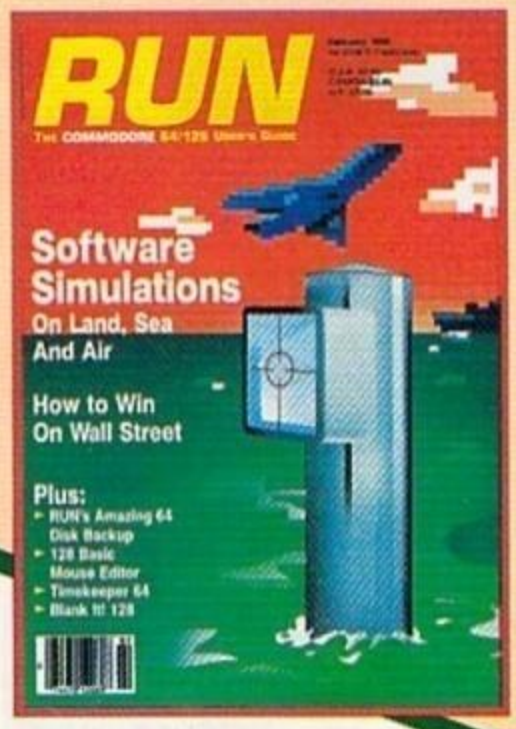

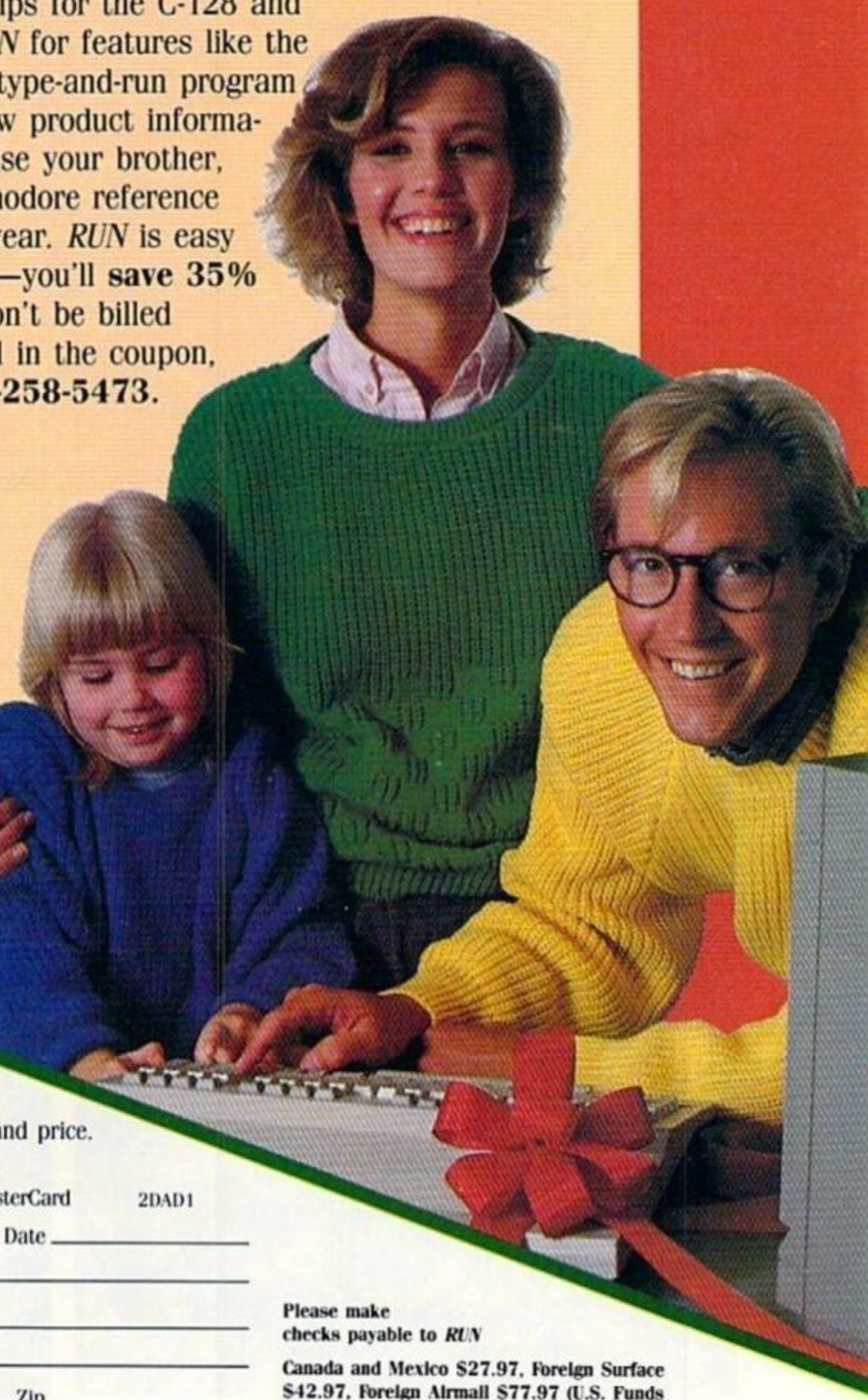

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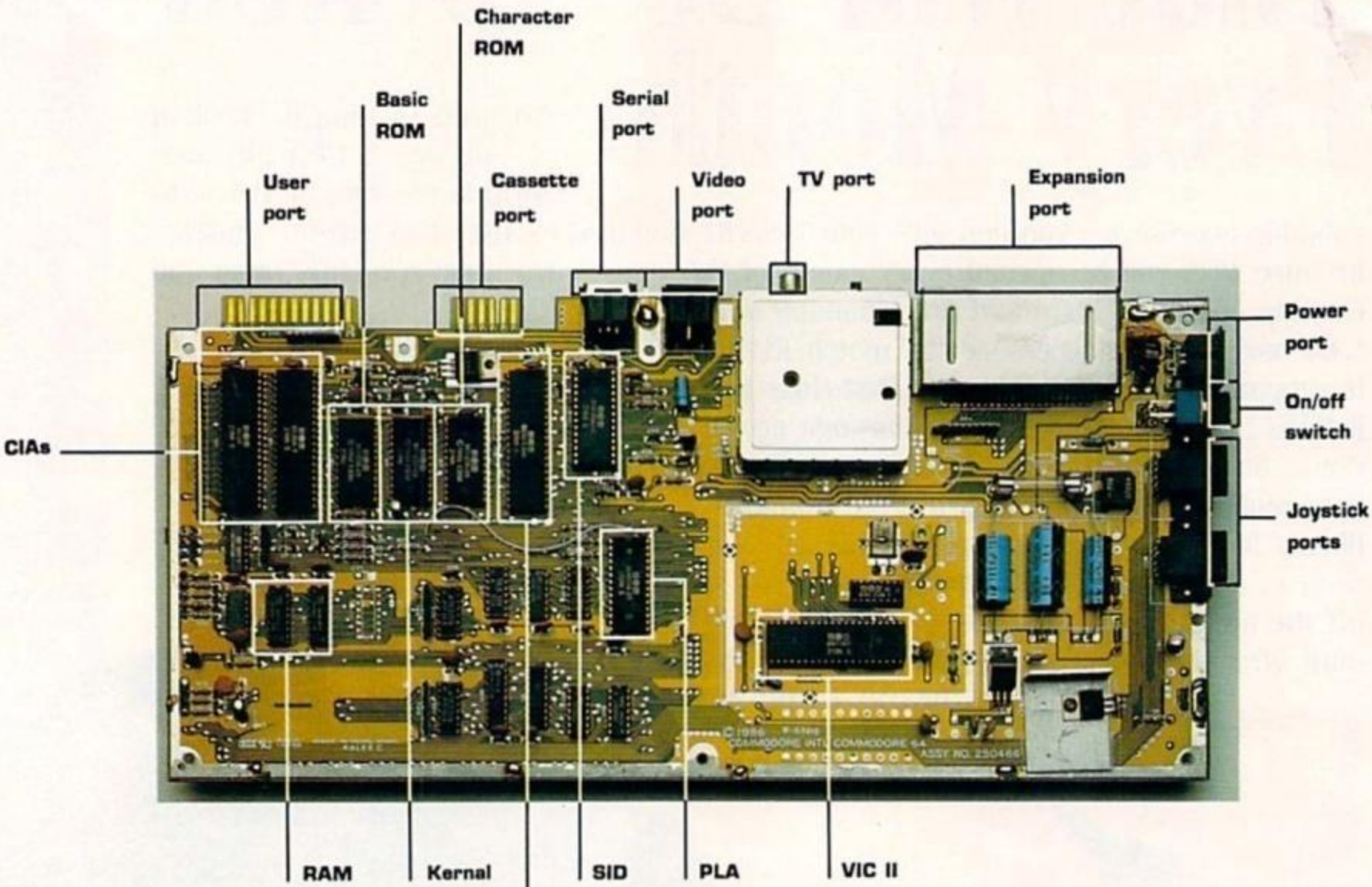
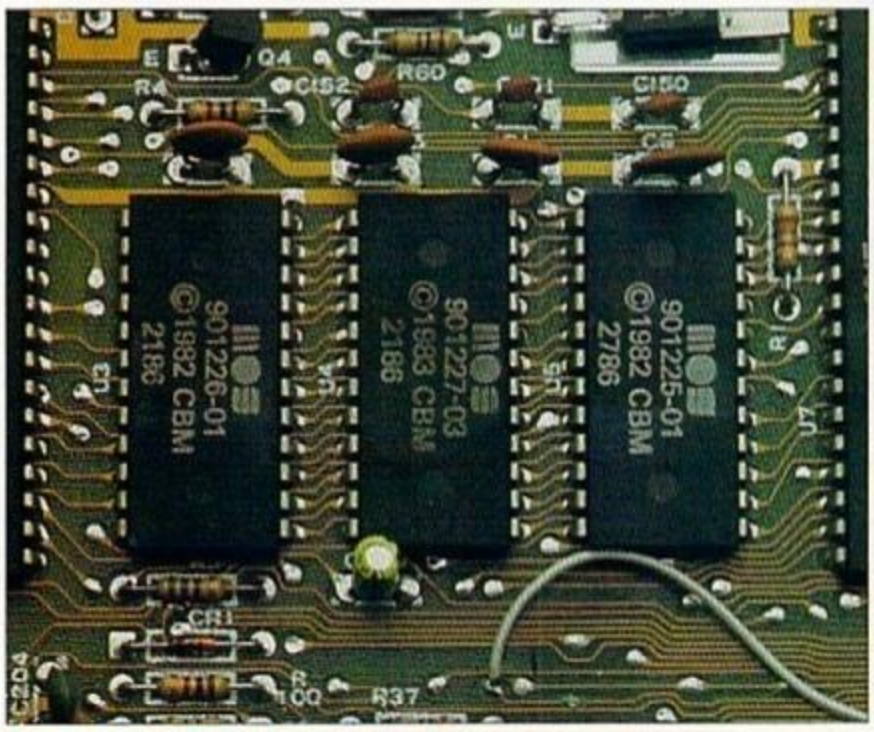
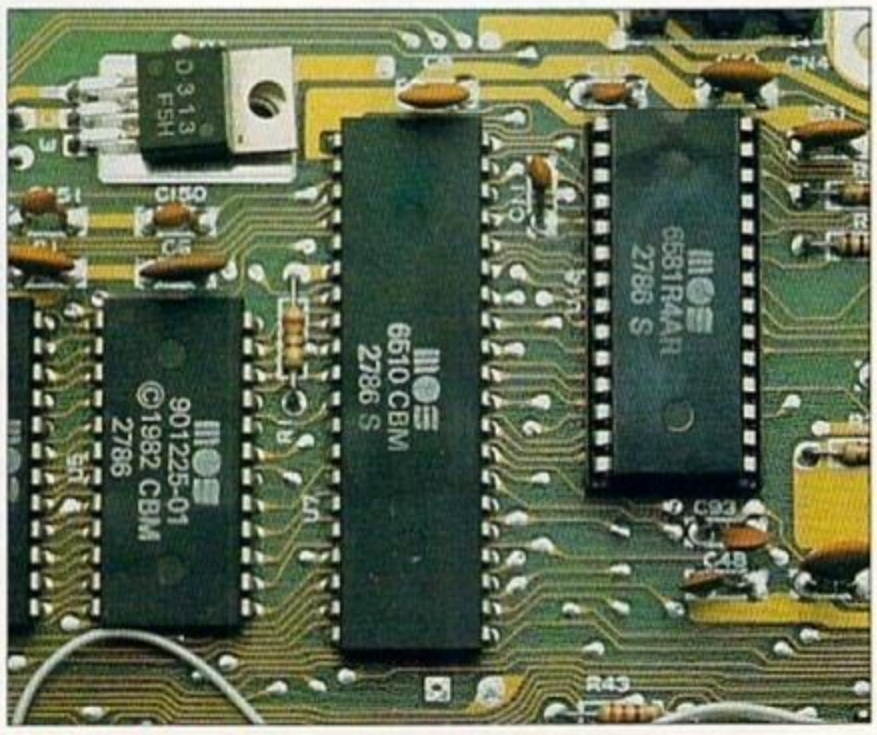




The C-64's Basic, Kernal and Character ROMs.



The C-64's 6510 CPU and SID chip.

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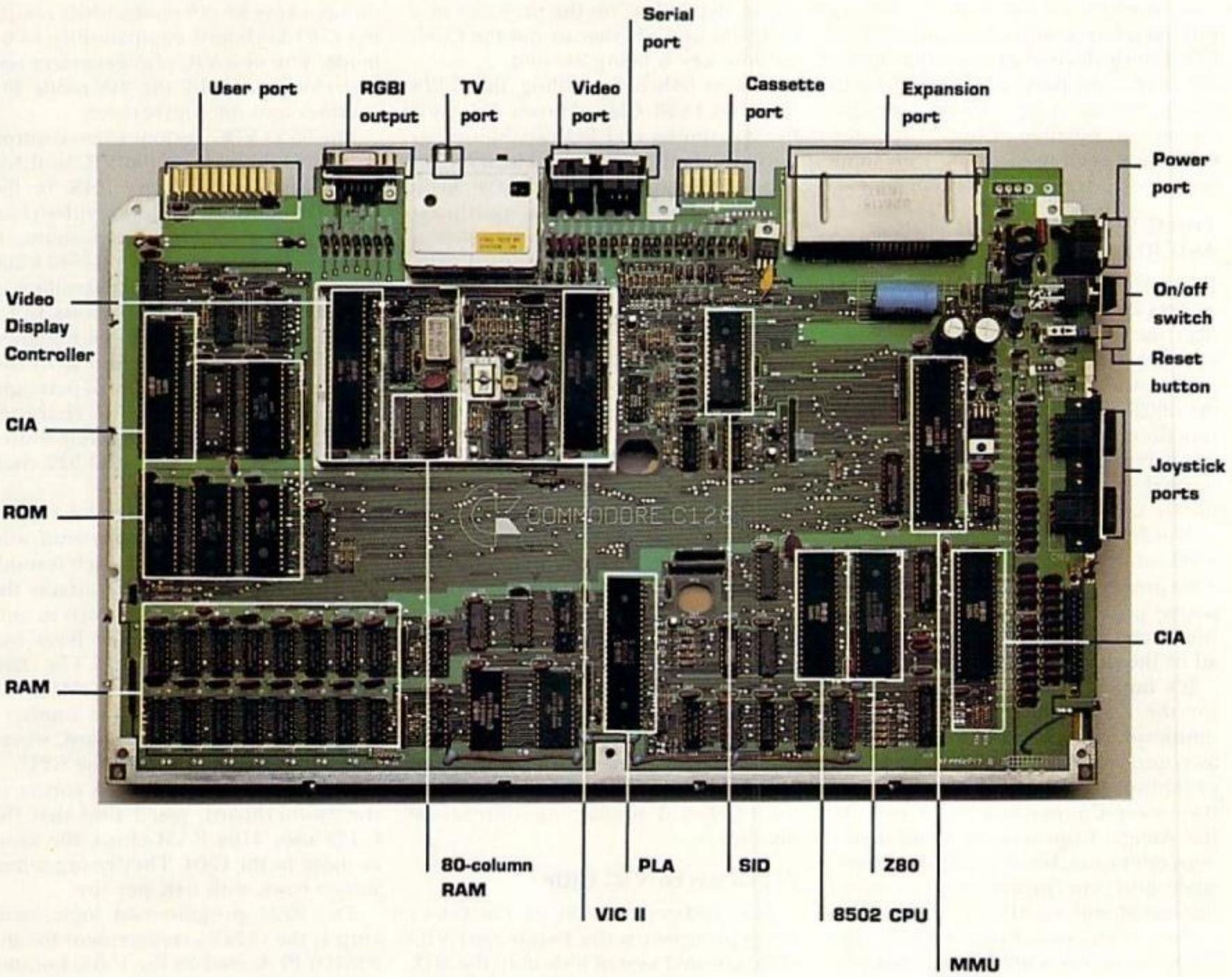
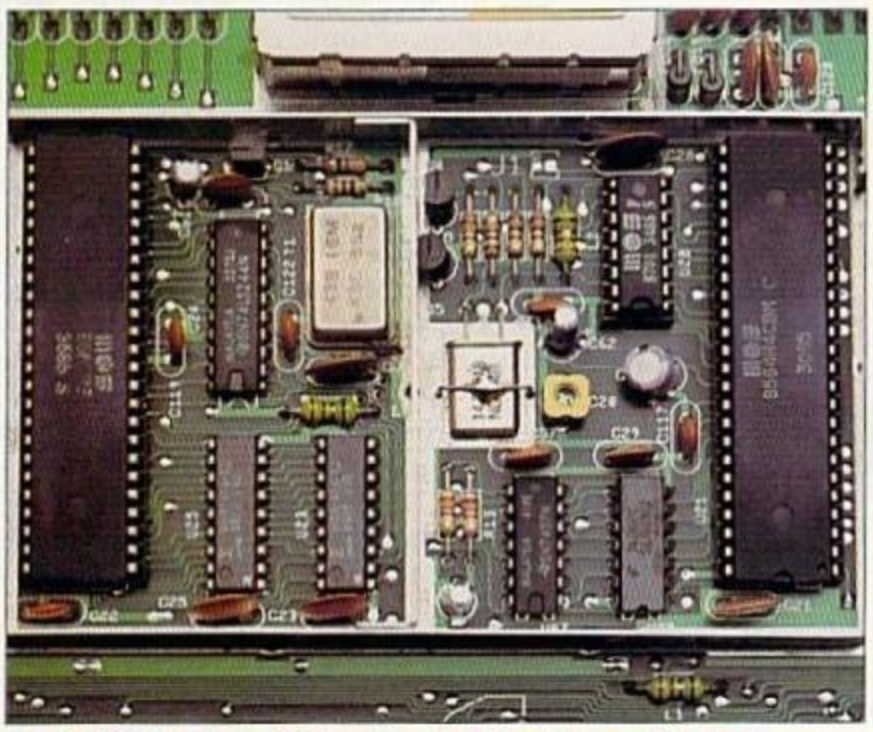
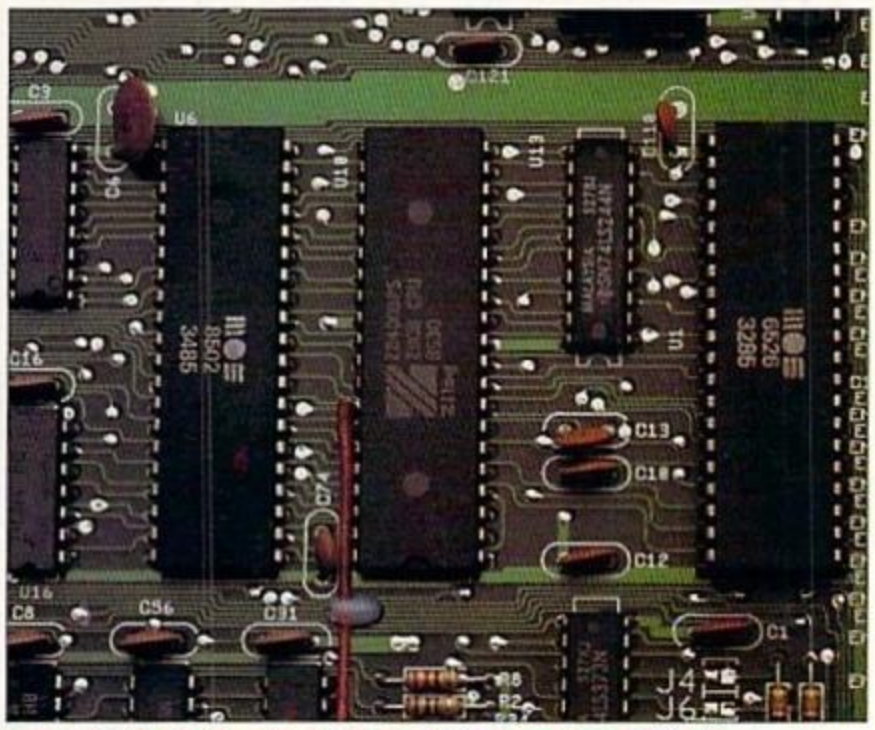




The C-128's 40- and 80-column graphic chips and the 80-column VDC RAM.



The C-128's CPUs—the 8502 and Z80—and one CIA chip.

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An 80-column screen is supported in the 128 and CP/M modes, interfacing RGB and monochrome outputs by means of an IBM-style connector.

Contrary to what you may think, you can't dismantle your C-128 and have three separate computers! Commodore has cleverly devised a system that allows the sharing of parts and operations to bring you as much power for your money as possible. Chips from the C-64 have been used, along with some new devices. Let's take a closer look.

The C-128 Microprocessor And Related Chips

Entering the C-128, we find that it utilizes an 8502 microprocessor, located near the southeast corner of the motherboard. The 8502 is upwardly compatible with the 6510 in the C-64 and the 6502 in the VIC-20, meaning that it functions similarly to the earlier CPUs, but is faster and more capable. It's the normal operating processor for both the 64 and 128 modes.

The Z-80A chip, which lies east of the 8502 and is a version of the standard Z-80 processor, is included as an alternative processor in the C-128 system. Interfaced to the 8502 bus, it can access all of the devices that the 8502 can.

It's important in normal operation for the Z-80A and the 8502 to communicate with each other and operate as coprocessors. Perhaps you've heard of multiprocessing, or multitasking, in the newer Commodore machines like the Amiga. Coprocessing is an analogous operation, but it's serial in nature, since only one processor can control the bus at any one time.

Processor switching enables the Z-80A to access 8502 Kernal routines, especially the I/O routines. On the other hand, the C-128 must power up with the Z-80A as the master processor, since that chip can activate certain C-64 applications that would make the 8502 crash. After some initializing, the Z-80A starts up the 8502 in either 128 or 64 mode, depending on the presence of a cartridge and whether or not the Commodore key is being pressed.

Like its 64K older sibling, the C-128 uses two 6526 CIAs, known for their flexible timing and I/O capabilities, as peripheral interface chips. However, on the C-128 motherboard they've been split up; one remains at the northwest corner of the board, while the other is in the southeast, next to the Z-80A chip.

Access to RAM in the C-128 is controlled by the 8722 memory management unit, or MMU. Lying to the north of the eastern CIA, this 48-pin chip handles the complex control of the C-128's memory resources. It selects between the 8502 and the Z-80A chips, manages the address bus and translates data coming across it, selects the computer mode (64, 128 or CP/M) and manages the bank-switching of RAM. (Since the 8502 and Z-80A can address only 64K, the memory is broken into "banks" that are addressed separately.) Compatible with 64 mode, the MMU handles all standard C-64 modes of operation.

Moving to the west, along the northern part of the motherboard, is the C-128's SID—the same 6581 chip used in the C-64. Capable of music, speech and sound effects, it's compatible with the 8502 and similar microprocessor families.

An Updated VIC Chip

The updated version of the C-64's video processor is the 48-pin 8564 VIC chip. Located west of its buddy, the SID, the 8564 provides all the video capabilities of the earlier VIC 6567, including hi-res, bitmapped graphics, plus new features such as extended scanning of three additional keyboard control lines by its keyboard control register. Thus, the C-128 keyboard can have additional keys in 128 mode, while retaining C-64 keyboard compatibility in 64 mode. The new VIC also generates several clocks used by the 128-mode I/O routines and microprocessor.

The 8563 VDC custom video controller lies to the west of the VIC and has 16K of its own memory (64K in the C-128D) for use in displaying video characters and storing screen contents. It also provides high-resolution (640 × 200 pixel) graphics and smooth scrolling in vertical and horizontal directions. In addition, this text display chip is designed to implement the 80-column RGB display screen with a minimum of parts and cost. The 8563 provides two character sets, each with 256 elements, and, unlike the older VIC, can display all 512 characters simultaneously.

The C-128 operating system resides in ROM located in four chips south and west of the 8563. ROM 1, which is south of the northwestern CIA, contains the 64 Kernal and Basic—two chips in one. Advanced C-128 Kernal and Basic features are in ROMs 2, 3 and 4. The character ROM, near the other ROMs in the C-64, is off and away at the southern part of the C-128 motherboard, where it's shared by the VIC and the CPU.

Moving into the southwest corner of the motherboard, you'll find that the C-128 uses 4164 RAM chips, the same as those in the C-64. They're organized in two rows, with 64K per row.

The 8721 programmed logic array chip is the C-128's replacement for the 82S100 PLA used in the C-64. Located in the south-central region of the board, it decodes and selects the chips necessary for 64-mode operation, along with a number of similar new functions vital to the operation of 128 mode.

The End of the Line

Ladies and gentlemen, this completes our tour of your Commodore computer. Please remain seated until the bus comes to a full stop. If you've found the tour interesting and want to look around some more, the books listed in Table 1 may be of help. They aren't necessarily written for the beginner, but if you're determined, they'll initiate you into the fun and rewards of both machine language programming and maintenance and repair of your Commodore system. ■

Ellen Rule is a Psychiatric R. N. who finds time not only for extensive user group involvement, but also for a home-based business, Home Computer Resource.

Table 1. Books to take you further.

C-64 Programmer's Reference Guide
Commodore Business Machines, Inc.; 1982

C-128 Programmer's Reference Guide
Commodore Business Machines/Bantam Books; 1986

Commodore 128 Internals
by Geuts, Scheib and Thrum
Abacus Software; 1985

Troubleshooting and Repairing Your C-64
by Art Margolis
TAB Books; 1985

C-64 Troubleshooting and Repair Guide
by Robert C. Brenner
Howard W. Sams; 1985

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Math Match

Learning arithmetic is no problem when you're concentrating on having fun.

By DAVID SCHNEIDER

Math Match is a one- or two-player game patterned after the card game Concentration, but with a *big* twist. You don't try to match two identical symbols; instead, you match an arithmetic problem with its answer.

Player 1 uses a joystick in port 1, and player 2 a joystick in port 2. The menus, which are controlled by joystick 1, let you specify one or two players and the type of arithmetic problems you want: addition, subtraction, multiplication, division, or a random mixture. You can also choose the maximum size of the numbers in the problems and the number of "cards" to be used.

To keep the game from getting absurdly difficult, all division problems work out evenly. However, subtraction problems may have negative answers.

After you go through the menus, the game screen appears, showing the cards "lying" face down and an asterisk on the card in the upper-left corner. Use your joystick to move the asterisk to any card on the screen, then press the fire-button to turn that card face up.

When you've turned two cards over, the computer checks for a match. If it finds one, the cards flash and then turn black, at which point you can continue your turn. If you haven't made a match, the cards turn face down again, either in a few seconds or when you move your joystick. And, if you have an opponent, it's then his or her turn. All the time you're playing, the top line of the screen displays the time elapsed and which player's turn it is.

When all the cards on the screen have been matched, the computer displays the game summary, telling how long the game lasted and how many tries it took to complete the matches. If you're in Two-Player mode, it also tells how many cards each player matched and declares the winner. R

David Schneider is currently a computer science major at Western Illinois University.

Listing 1. Math Match program.

```
5 REM MATH MATCH - DAVID SCHNEI
  DER                          :REM*133
10 PRINTCHR$(14)               :REM*98
15 DEFFND(X)=INT(RND(1)*SQR(B(X
   )))+1                       :REM*186
20 DEFFNJ(X)=CJ%(PL)-PEEK(CJ(PL
   ))                          :REM*35
25 DEFFNR(X)=INT(RND(1)*B(X))+Ø
                               :REM*25
30 DIM AN(32),C$(32):B(1)=1Ø:B(
   2)=2Ø:B(3)=5Ø:B(4)=99
                               :REM*178
35 C(1)=4:C(2)=8:C(3)=16:C(4)=2
   4:C(5)=32:CJ(1)=56321:CJ(2)=
   5632Ø                       :REM*73
40 CJ%(1)=255:CJ%(2)=127:N(1)=2
   :N(2)=5:N(3)=4:N(4)=5
                               :REM*194
45 S$(1)=" +":S$(2)=" -":S$(3)=
   " {SHFT V}":S$(4)=" /":VA(1)
   =.2:VA(2)=.2:PL=1:S=54272
                               :REM*82
50 C$="{CTRL 9}{8 COMD Ys}{SHFT
    P}{CRSR DN}{9 CRSR LFs}{8 S
   PACEs}{COMD M}{CRSR DN}{9 CR
   SR LFs}{8 SPACEs}{COMD M}{HO
   ME}"                        :REM*195
55 FORL=ØTO24:POKES+L,Ø:NEXT:PO
   KE54296,15:POKE53281,Ø:POKE5
   328Ø,Ø:GOTO1Ø5              :REM*84
60 A$(1)="{2 SPACEs}1 {SHFT P}L
   AYER {CRSR DN}":A$(2)="{2 SP
   ACEs}2 {SHFT P}LAYERS":NP=A:
   RETURN                      :REM*2Ø
65 A$(1)="{2 SPACEs}{SHFT A}DDI
   TION PROBLEMS..... +{7 SP
   ACEs}{CRSR DN}"             :REM*69
70 A$(2)="{2 SPACEs}{SHFT S}UBT
   RACTION PROBLEMS..... -{7 SP
   ACEs}{CRSR DN}"             :REM*178
75 A$(3)="{2 SPACEs}{SHFT M}ULT
   IPLICATION PROBLEMS.. {SHFT
   X}{7 SPACEs}{CRSR DN}"
                               :REM*126
80 A$(4)="{2 SPACEs}{SHFT D}IVI
   SION PROBLEMS..... /{7 SP
   ACEs}{CRSR DN}"             :REM*157
85 A$(5)="{2 SPACEs}{SHFT C}OMB
   INATION OF PROBLEMS.. + - {S
   HFT X} / {CRSR DN}":PP=Ø:P=A
   :IFP=5THENPP=1              :REM*2Ø
90 RETURN                      :REM*232
95 A$(Z)="{2 SPACEs}{SHFT O}NLY
    NUMBERS FROM Ø TO"+STR$(B(Z
   ))+"{CRSR DN}":B=A:RETURN
                               :REM*13Ø
100 A$(Z)="{2 SPACEs}"+STR$(C(Z
    ))+" CARDS{5 SPACEs}{CRSR D
    N}":C=A:RETURN             :REM*152
105 FORY=1TO4                  :REM*234
110 GOSUB5ØØ:FORZ=1TON(Y):ONYGO
    SUB6Ø,65,95,1ØØ:PRINTA$(Z):
    NEXTZ                      :REM*234
115 GOSUB52Ø:ONYGOSUB6Ø,65,95,1
    ØØ                         :REM*144
120 NEXTY                      :REM*173
125 POKE53281,5                :REM*254
130 PRINTCHR$(142)"{SHFT CLR}{C
    RSR DN}{CTRL 2}MAKING CARDS
    , PLEASE STAY TUNED!":REM*6
135 : FORT=1TOC(C)/2           :REM*62
140 IFPP=1THENP=INT(RND(1)*4)+1
                               :REM*11
145 X=FNR(B):Y=FNR(B)          :REM*241
150 IFP=4THEN Y=FND(B):Z=FND(B)
    :X=Y*Z                     :REM*217
155 P$="{CTRL 9}"+STR$(X)+S$(P)
    +STR$(Y):P$="{CTRL 9}"+RIGH
    T$(P$,LEN(P$)-1)           :REM*76
160 IFP=1THEN A$="{CTRL 9}"+STR
    $(X+Y):AN=X+Y              :REM*221
165 IFP=2THEN A$="{CTRL 9}"+STR
    $(X-Y):AN=X-Y              :REM*172
170 IFP=3THEN A$="{CTRL 9}"+STR ►
```

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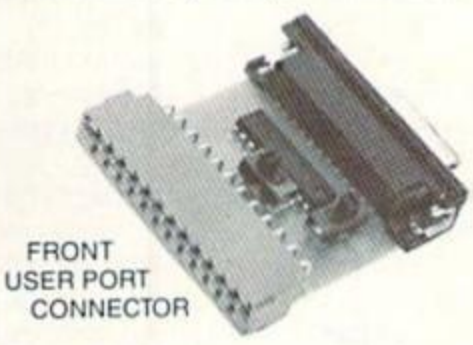

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MATH MATCH

```
    $(X*Y):AN=X*Y          :REM*132
175 IFP=4THEN A$="{CTRL 9}"+STR
    $(X/Y):AN=Z            :REM*29
18Ø X=INT(RND(1)*C(C))+1:IFC$(X
    )<>""THEN18Ø           :REM*28
185 C$(X)=P$:AN(X)=AN      :REM*186
19Ø X=INT(RND(1)*C(C))+1:IFC$(X
    )<>""THEN19Ø           :REM*52
195 C$(X)=A$:AN(X)=.Ø1     :REM*85
2ØØ : NEXT                 :REM*4
2Ø5 D=2:R=2:PRINT"{SHFT CLR}"
                           :REM*158
21Ø FORT=1TOC(C)/4:FORY=1TO4:GO
    SUB555:PRINT"{COMD 2}"C$:R=
    R+9:NEXTY:R=2:D=D+3:NEXTT
                           :REM*193
215 AW=Ø:CO=Ø:D=2:PR=Ø:R=2:X=11
    1Ø:XX=16Ø:CN=1:POKEX,17Ø
                           :REM*134
22Ø TI$="ØØØØØØ":PRINT"{HOME}"S
    PC(29)"{CTRL 1}PLAYER";PL
                           :REM*212
225 J=FNJ(Ø):PRINT"{HOME}{CTRL
    1}{2 CRSR RTs}TIME = ";MID$
    (TI$,3,2);":";RIGHT$(TI$,2)
    :IFJ=ØTHEN225          :REM*69
23Ø IFJ=16THENGOSUB27Ø     :REM*2
235 POKEX,XX               :REM*2Ø3
24Ø IFJ=1ANDX>1144THENX=X-12Ø:D
    =D-3:CN=CN-4           :REM*81
245 IFJ=2AND X < 11Ø4+((C(C)-4)
    *3Ø) THENX=X+12Ø:D=D+3:CN=C
    N+4                    :REM*2Ø9
25Ø IFJ=4ANDPEEK(X-5)<>32THENX=
    X-9:CN=CN-1:R=R-9      :REM*39
255 IFJ=8ANDPEEK(X+5)<>32THENX=
    X+9:CN=CN+1:R=R+9      :REM*222
26Ø XX=PEEK(X):POKEX,17Ø:REM*84
265 GOTO225                :REM*99
27Ø IF PEEK (X-3) <>16Ø THEN RE
    TURN                   :REM*4
275 CO=CO+1                :REM*255
28Ø GOSUB555:PRINT"{CTRL 2}"C$:
    GOSUB555:PRINT"{CRSR DN}"C$
    (CN)                   :REM*24Ø
285 XX=PEEK(X):CC$(CO)=C$(CN):D
    (CO)=D:R(CO)=R         :REM*12
29Ø IFAN(CN)=.Ø1 THEN VA(CO)=VA
    L(RIGHT$(C$(CN),LEN(C$(CN))
    -1)):AW=AW+1:GOTO3ØØ
                           :REM*157
295 VA(CO)=AN(CN):PR=PR+1
                           :REM*232
3ØØ IF(VA(1)=VA(2))AND(PR=1ANDA
    W=1)THENT$=TI$:GOTO 34Ø
                           :REM*57
3Ø5 IFCO=1THENRETURN       :REM*182
31Ø PT=TI                  :REM*6
315 IF NP=2 AND PL=1THEN PL=2:G
    OTO325                 :REM*2Ø5
32Ø IF NP=2 AND PL=2THEN PL=1
                           :REM*11Ø
325 J=FNJ(Ø):IFJ=Ø AND PT+2ØØ>T
    I THEN325              :REM*214
33Ø A$="{COMD 2}":VA(1)=.2:VA(2
    )=.2:CO=Ø:AW=Ø:PR=Ø:TRY(PL)
    =TRY(PL)+1:XX=16Ø:GOSUB55Ø
                           :REM*56
335 PRINT"{HOME}"SPC(29)"{CTRL
    1}PLAYER ";PL:RETURN:REM*37
34Ø MA(PL)=MA(PL)+1:POKES,25Ø:P
    OKES+1,168:POKES+5,9
                           :REM*15Ø
345 FORU=1TO5:A$="{CTRL 2}":GOS
    UB55Ø:POKES+4,17:FORT=1TO25
    :NEXT:POKES+4,16:A$="{CTRL
    1}"                    :REM*223
35Ø GOSUB55Ø:FORT=1TO2Ø:NEXT:NE
    XTU                    :REM*79
355 FORT=1TO2:D=D(T):R=R(T):GOS
    UB555:PRINT"{CRSR DN}";CC$(
    T):NEXT                :REM*6Ø
36Ø VA(1)=Ø.2:VA(2)=Ø.2:CO=Ø:AW
    =Ø:PR=Ø:TRY(PL)=TRY(PL)+1:X
    X=PEEK(X)              :REM*48
365 IFC(C)/2 = (MA(1)+MA(2)) TH
    ENFORT=1TO2ØØØ:NEXT:GOTO375
                           :REM*239
37Ø POKEX,17Ø:RETURN       :REM*54
375 PRINT"{SHFT CLR}{CTRL 6}"CH
    R$(14):POKE53281,1:POKE5328
    Ø,1                    :REM*22
38Ø PRINTSPC(14)"{CTRL 1}{SHFT
    G}{SHFT A}{SHFT M}{SHFT E}{
    SHFT SPACE}{SHFT S}{SHFT U}
    {2 SHFT Ms}{SHFT A}{SHFT R}
    {SHFT Y}":PRINT"-----------
    ---------------------------
    --"                    :REM*253
385 PRINT"{COMD 4}{CRSR DN} {SH
    FT T}IME ELAPSED IS{CTRL 3}
    ";                     :REM*226
39Ø X=VAL(MID$(T$,3,2)):IFXTHEN
    PRINTX;"{SHFT M}{SHFT I}{SH
    FT N}{SHFT U}{SHFT T}{SHFT
    E},";                  :REM*151
395 IFX>1THENPRINT"{CRSR LF}{SH
    FT S},";               :REM*182
4ØØ Y=VAL(RIGHT$(T$,2)):PRINTY;
    "{SHFT S}{SHFT E}{SHFT C}{S
    HFT O}{SHFT N}{SHFT D}{SHFT
     S}."                  :REM*75
4Ø5 PRINT"{CRSR DN}{COMD 4} {SH
    FT Y}OU USED{CTRL 3}";C(C);
    "CARDS.{2 CRSR DNs)":REM*16
41Ø FORT=1TONP              :REM*217
415 PRINT"{CRSR RT}{CTRL 1}{SHF
    T P}LAYER{CTRL 3}";T;"{CRSR
     LF}{CTRL 1}, YOU TOOK{CTRL
     3}";TRY(T);"TRIES{CTRL 1}
    TO MATCH{CTRL 3}"; :REM*216
42Ø PRINTMA(T)*2;:PRINT"{CRSR R
    T}CARDS.":NEXT         :REM*78
425 IFNP=1THEN455          :REM*72
43Ø IF MA(1)>MA(2)THEN45Ø
                           :REM*159
435 IF MA(2)>MA(1)THEN445
                           :REM*223
44Ø IFTRY(2)>TRY(1)THEN45Ø
                           :REM*86
445 PRINT"{CTRL 3}{2 CRSR DNs}{
    CTRL 9}{SHFT P}{SHFT L}{SHF
    T A}{SHFT Y}{SHFT E}{SHFT R
    } 2 {SHFT W}{SHFT I}{SHFT N
    }{SHFT S} !!!!!":GOTO455
                           :REM*136
45Ø PRINT "{CTRL 3}{2 CRSR DNs}
    {CTRL 9}{SHFT P}{SHFT L}{SH
    FT A}{SHFT Y}{SHFT E}{SHFT
    R} 1 {SHFT W}{SHFT I}{SHFT
    N}{SHFT S} !!!!!"      :REM*248
455 PRINT"{2 CRSR DNs}{CTRL 1}-
    ---------------------------
    -----------{CTRL 3}"
                           :REM*185
46Ø PRINT"{SHFT P}USH {CTRL 9}{
    SHFT U}{SHFT P}{CTRL Ø} ON
    THE {SHFT J}{SHFT O}{SHFT Y
    }{SHFT S}{SHFT T}{SHFT I}{S
    HFT C}{SHFT K} TO PLAY AGAI
    N{CRSR DN}":PRINT"{SHFT P}U
    LL {CTRL 9}{SHFT D}{SHFT O}
    {SHFT W}{SHFT N}{CTRL Ø} TO
     QUIT"                 :REM*24Ø
465 J=FNJ(Ø)               :REM*148
47Ø IFJ=1THENRUN           :REM*66
475 IFJ=2THENPRINT"{SHFT CLR}{2
     CRSR DNs}{SHFT G}OOD {SHFT
     B}YE !":FORT=1TO1ØØØ:NEXT:
    END                    :REM*75
48Ø GOTO465                :REM*67
485 POKES,1Ø4:POKES+1,9:POKES+5
    ,9                     :REM*53
49Ø D=23:R=15:GOSUB555:PRINT"{C
    TRL 9}{CTRL 2}{SHFT T}{SHFT
     H}{SHFT A}{SHFT N}{SHFT K}
    {SHFT SPACE}{SHFT Y}{SHFT O
    }{SHFT U}{SHFT SPACE}!{CTRL
     Ø}":POKES+4,33:FORT=1TO8ØØ
    :NEXT                  :REM*192
495 POKES+4,32:RETURN      :REM*36
5ØØ PRINT"{SHFT CLR}{CRSR DN}{C
    TRL 9}{CTRL 6}{11 SPACEs}{S
    HFT M} {SHFT A} {SHFT T} {S
    HFT H}{2 SPACEs}{SHFT M} {S
    HFT A} {SHFT T} {SHFT C} {S
    HFT H}{11 SPACEs}" :REM*253
5Ø5 PRINT"{HOME}{2 CRSR DNs}{CT
    RL 3}{7 SPACEs}{SHFT A} GAM
    E OF SKILL AND MEMORY{5 CRS
    R DNs}"                :REM*129
51Ø PRINT"{COMD 8}{SHFT M}OVE {
    SHFT J}{SHFT O}{SHFT Y}{SHF
    T S}{SHFT T}{SHFT I}{SHFT C
    }{SHFT K} 1 TO MAKE YOUR CH
    OICE THENPRESS THE {SHFT F}
    {SHFT I}{SHFT R}{SHFT E} {S
    HFT B}{SHFT U}{2 SHFT Ts}{S
    HFT O}{SHFT N}."   :REM*16Ø
515 PRINT"{CTRL 3}{4Ø COMD Us}"
    ;:A=1:D=12:R=Ø:RETURN
                           :REM*167
52Ø GOSUB555:PRINT"{CTRL 9}{CTR
    L 3}";A$(A):FORT=1TO1Ø:NEXT
                           :REM*137
525 J=FNJ(Ø)               :REM*2Ø8
53Ø IFJ=1ANDA>1THENGOSUB555:PRI
    NT"{CTRL Ø}{CTRL 3}";A$(A):
    A=A-1:D=D-2            :REM*2Ø1
535 IFJ=2ANDA<N(Y)THENGOSUB555:
    PRINT"{CTRL Ø}{CTRL 3}";A$(
    A):A=A+1:D=D+2         :REM*191
54Ø IFJ=16 THENGOSUB485:RETURN
                           :REM*165
545 GOTO52Ø                :REM*11Ø
55Ø FORT=1TO2:D=D(T):R=R(T):GOS
    UB555:PRINTA$C$:NEXT:RETURN
                           :REM*195
555 POKE211,R:POKE214,D:PRINT"{
    CRSR UP}";:RETURN  :REM*145 ■
```

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Fighting Diabetes With a Commodore

When a chapter of the American Diabetes Association sought to raise public awareness, it enlisted the aid of a C-64.

By JERRY MCLAIN

Diabetes mellitis is the third leading cause of death in the United States. Unfortunately, much of the general public is uninformed or misinformed about the disease. This is where a computer can come in handy.

While the number-crunching capabilities of business computers can help organizations compile statistics and produce form letters, educating the public demands something that will flash a vivid message to attract the average person's attention. Because of their high-level graphics capabilities and flexibility, as well as their nominal cost and easy operation, the C-64 and compatible series (C-128 and SX-64) are ideally suited to this task.

Risk Analysis

In 1985, the Texas affiliate of the American Diabetes Association (ADA) produced a diabetes risk-factor analysis, which, in the form of a one-page questionnaire, queried the incidence of diabetes in a respondent's family. It also asked about cultural background and medications taken, and it cross-referenced height and weight to determine whether a respondent was overweight and by what percentage. Each question was assigned a value, and the values were totaled to produce a score corresponding to low, medium or high risk.

The questionnaire was suitable for interactive use if a computer-based program to administer and analyze it could be developed. Using a computer for such a task was a novel idea, and it was obvious that such a program would interest the public as well as the ADA.

Work on the computer project began in the summer of 1985. Several programming utilities were used, including a "printat" machine language routine and a custom printer routine to produce a printout bordered with ADA logos. Printing was designed to be on continuous adding machine rolls to save paper and create a pocket-size report. A colorful graph, inspired by Doug Smoak's Graphmaker 64 program (*RUN*, April 1985), shows the risks for each person. The program interacts with the respondent by printing his or her name on the screen as salient points are made.

A rather lengthy routine was added to display a crawling message in large text when an analysis is not being run. This makes the program ideal for displays where a colorful, eye-catching teaser and bulletin board are needed.

Other features of the program include a non-hard-copy mode, in case a printer is not available, as well as an additional set of semianimated text screens that show the warning signs of Type I and Type II diabetes. Finally, the program stores the number of persons being analyzed, their risk levels and the number who are overweight (for record-keeping purposes).

User Interaction

The program is set up on an SX-64 computer connected to an MPS-803 printer. A radio-frequency modulator (originally designed for a TI-99 computer) was modified with its own power supply and plugged into the video port of the SX-64, allowing a standard television set to be connected to the system. This provides a large marquee, as well as a place for respondents to see and undergo the analysis. If a standard C-64 or C-128 computer and disk drive are used, an unmodified television set can be connected directly to the computer.

A final addition to the program allows respondents to be analyzed without using the computer keyboard. A custom controller consisting of three buttons is mounted in a metal box and attached to a cable that plugs into the joystick port. The program reads the buttons pressed on the controller and translates them into responses to questions. While a standard joystick can be used, this custom controller, labeled with the buttons' functions, facilitates analysis, especially if someone is intimidated by using the keyboard.

The program was first used in the fall of 1985 and has since been employed successfully at county and health fairs throughout the area around Vernon, Texas. While the analysis requires about five minutes to complete, turnaround time can be speeded by having an operator ask the questions and enter the correct responses.

Graphics/Text Simulation

The extensive graphics capabilities of the C-64 led to another application. Because diabetes is a difficult disease to understand, its role in the biology of the human body is best understood if illustrated. Thus, a graphics/text simulation explaining diabetes was developed. Graphics Basic (HesWare) was chosen as the utility language, and the program was converted to Toolkit Basic (Epyx), which also permits the addition of support code allowing the program to run on any C-64. Both programs have superior graphics and animation.

In the simulation, a text window at the bottom of the screen explains what's taking place in animation above, with high-resolution drawings of the body, bloodstream and a single cell. Drawings were made using Commodore high-resolution graphics packages, including Doodle! and Flexidraw. Sprites appear and move on the screen in animated vignettes showing the pancreas, how food is digested, insulin, sugar, cell receptors and how sugar gets into the cells and is converted to energy.

The program is self-repeating, so it

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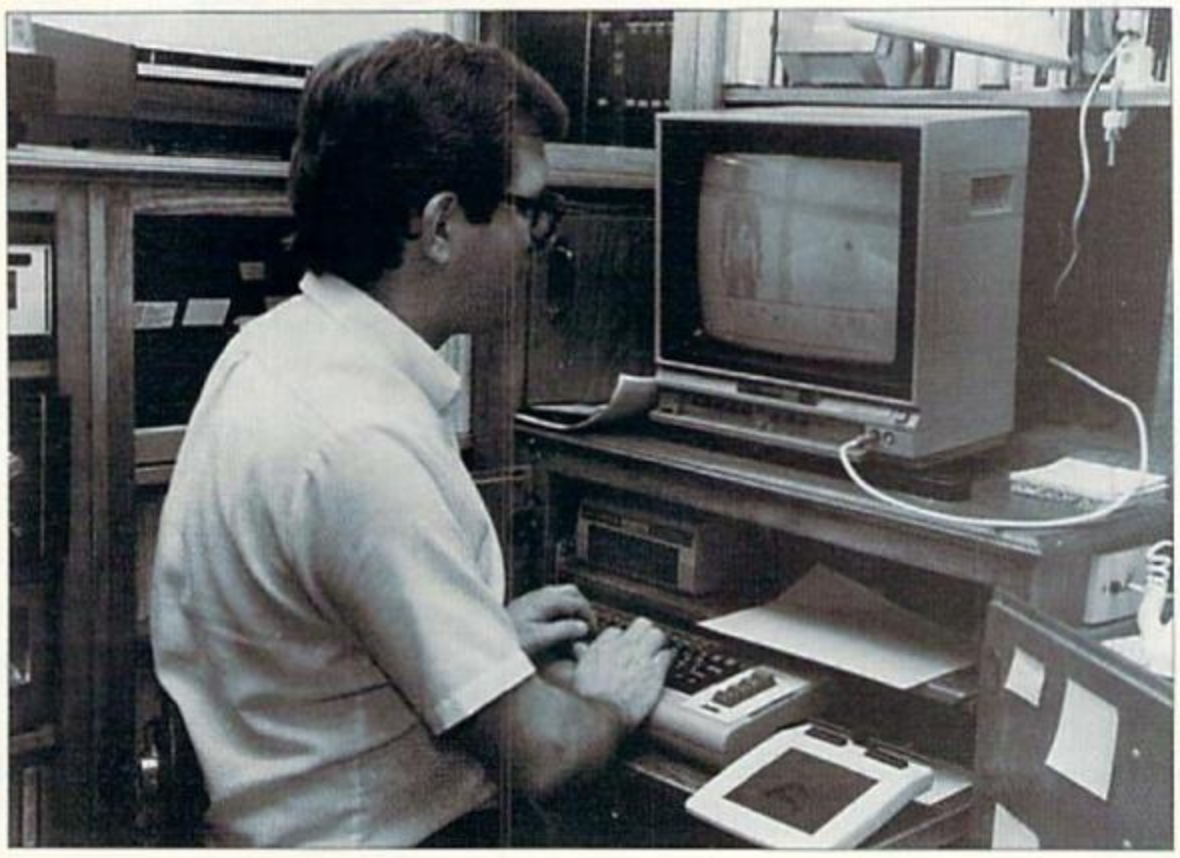

Author Jerry McLain preparing the Diabetes Simulation program at his C-64 workstation.

can be left unattended. It is relatively short, so visitors to an ADA booth or display can see the entire simulation in a brief time. The program is used to teach direct-care employees about diabetes at the Vernon State Hospital. It was converted to a videotape presentation for that application.

Lively Videos

Computer graphics and animation also can add excitement, interest and a degree of professionalism to videotapes. While the font resolution cannot compare to a professional video paint-box/character-generator system, the C-64 is capable of producing animation and graphics otherwise unobtainable in a small-format video system—and at a nominal cost. The same software used to generate the simulation graphics described above can be used for video by feeding the composite video output of the C-64 to the video input of any videotape recorder. You can also enhance it with other software and firmware.

The annual meeting of the Texas affiliate of the ADA afforded the Vernon chapter an opportunity to produce a video presentation showing chapter activities and achievements in fund raising, education and community involvement. Both high-resolution and multicolor graphics were used by themselves and included for emphasis in animated sequences of the videotape narration.

One example of a sequence is a graphic of Texas, produced by digitizing a map using the ComputerEyes firmware, converting it to Animation Station (Blazing Paddles) format to add text and refinements, and then creating sprites showing counties served by the Vernon chapter. All elements were brought together in Graphics Basic, where sprites were added on the map one by one, cued by the audio narration and dubbed on the videotape. Once again, the computer provided a close approximation of a professional video graphics system at a fraction of the cost.

Endless Possibilities

The Vernon ADA chapter has many other uses for the computer. For example, members use Print Shop to produce flyers advertising patient education meetings, and they use The Newsroom to produce the chapter newsletter. Flexibility in formatting allows variety in production, and there's been an increase in both readership of the newsletter and in contributions since computerized production began.

Another specialized application was production of ticket receipts for a fund-raising campaign. Contributors had to keep their stubs to claim a prize, and the chapter had to keep the other half for the drawing. A two-part, sequentially numbered ticket/receipt form was needed.

A short program written for the C-64 allowed individual receipts to be printed on pairs of standard mailing labels. One label could be placed on an ADA leaflet to serve as a receipt (and diabetes education tool), while the other could be retained by the chapter. The computer produced a quality product at a reasonable cost within the specified time constraints. Ordering custom-printed and numbered tickets from a printing house probably would have cost more than the entire C-64 system.

A related computer application is under development. Public displays are often aimed at children, and an excellent way to attract them is through video games. Two are being considered: an arcade-style action or computer board game and a more traditional question game that's similar to a computer trivia contest. These could be used to educate recently diagnosed young diabetics, as well as to capture the attention of non-diabetic children.

The future looks bright for the C-64 in health-related applications. As the ADA has shown, creative use of a computer can make a difference in educating and motivating the public. ■

Jerry McLain is Information and Publicity Director at the Vernon State Hospital in Texas and a founder and officer of the Vernon chapter of the American Diabetes Association.

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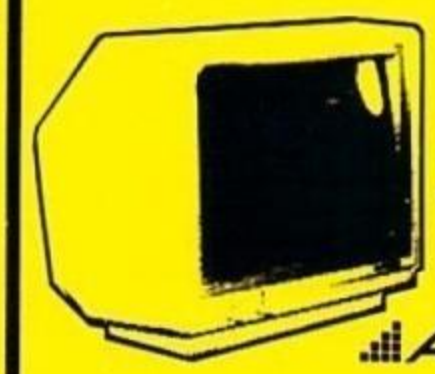

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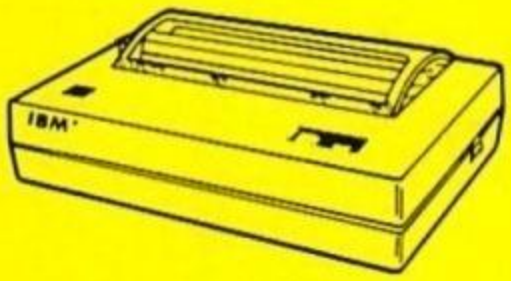

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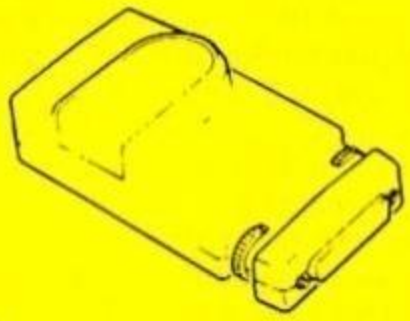

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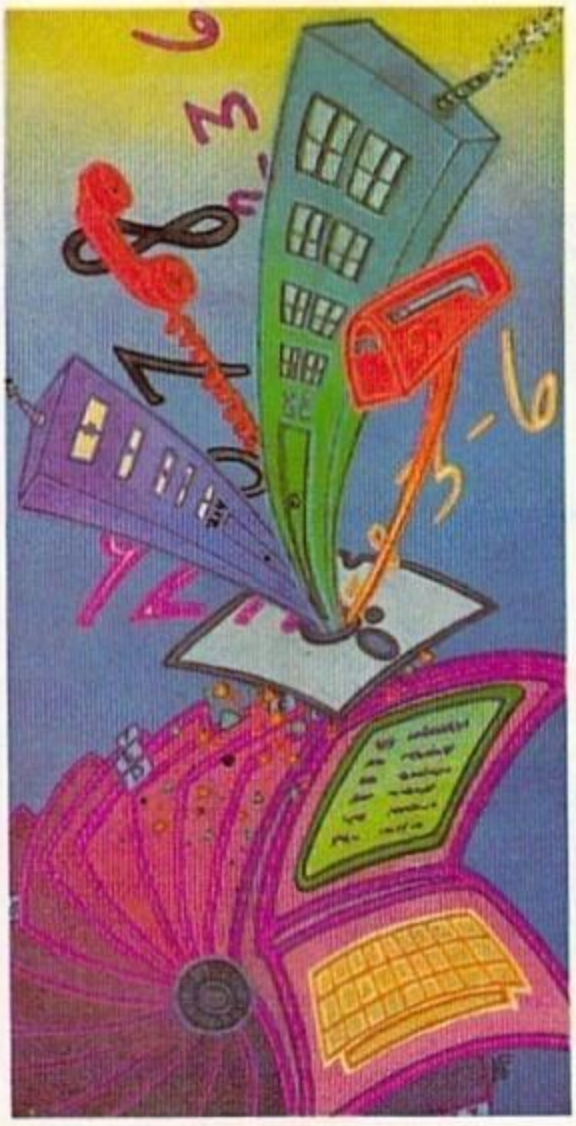
Instant Address Book

Let your computer do the walking with this handy 128 program that stores addresses and phone numbers.

By LOREN LOVHAUG

Rolodex Replacer 128 (RR128) is a Basic 7.0 program that quickly stores and recalls telephone and address information. Unlike most Rolodex programs you may have seen, this one is totally self-contained—your data is actually stored as Data statements within the program itself. The advantage to this approach is that once you load RR128 from disk, the program never has to access the disk drive again, making it fast and convenient to use. Another nifty feature of RR128 is its ability to stand by in a 1700 or 1750 RAM Expansion unit (REU) while you load and run another program.

Once you've typed in Listing 1 and saved it to disk, enter DLOAD or RUN to use RR128. The program begins by initializing itself and then determining whether you have an REU attached to your computer. The main menu appears next. Notice that the title bar lists the total amount of RAM that's available in your system (128K without an REU, 256K with a 1700 or 640K with a 1750). The five options on the main menu are: Browse, Find, Add, Save and Escape. To select one, press the first letter of any of the first four options or the escape key, which will exit the program.



Menu Options

The **Browse** option lets you examine up to five entries at a time in your RR128 database. Use the up-and-down cursor key to scroll forward and backward through your data or the escape key to return to the main menu.

The **Find** option quickly locates records according to one of the RR128 data fields: Name, Address, City, State or Zip. Press the first letter of a field to enter search data for that field. Once you've entered the data and pressed return, RR128 will locate all the entries containing that data within the field you chose.

The search data can contain as many characters as you like, and the more you enter, the more specific your search can be. When RR128 finds your search data, it displays the records involved and offers three options: Change a record, Delete a record and Escape to the main menu. Like the main menu options, these are selected by pressing the first letter or the escape key. If the program doesn't find your search data, it notifies you and returns you to the main menu.

The **Add** option is for entering new data into your database. Just fill in the blanks provided for each field, using the C-128's screen editor to correct any typing mistakes. You can even use the screen editor's escape-key sequences, such as escape/A (toggles Auto-Insert mode) and escape/J or escape/K (move to the beginning or end of your data, respectively). Another RR128 feature that speeds data entry is the special "data recall" option, which lets you press just @ and return to repeat field definitions.

After you've finished entering data, you're asked if you want to make any changes. If so, press the first letter of the field you wish to alter and make your changes; otherwise, press return to signify that your data is just the way you want it. Pressing escape aborts the entry process and returns you to the main menu.

The **Save** option resaves RR128 to disk, with any additions or changes incorporated. When you select this option, the program asks for a filename and offers the filename you used the last time as a default. If you choose this default, the previous version of RR128 gets scratched during the save.

Once you select a filename, RR128 asks which disk unit you'd like to save the program to. Respond with a valid drive unit (8–11). After the save, RR128 displays the directory of the disk in the unit you specified.

Pressing the **escape** key at the main menu exits RR128 in a way that depends on whether you have an REU connected to your computer. If no REU is present, program execution ends; but, in case you forgot to save the program, it isn't erased from the computer's memory. You can then save it manually by entering DSAVE or restart it by entering GOTO 99.

If you have an REU connected, such

Continued on p. 97.

RUN it right: **C-128, in 80-Column mode; 1700 or 1750 RAM Expander optional**

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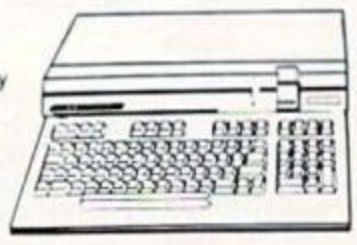

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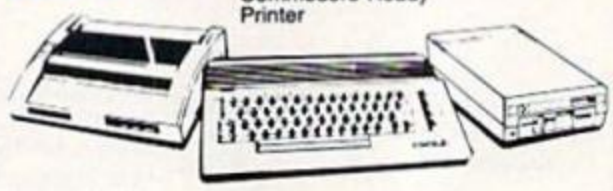

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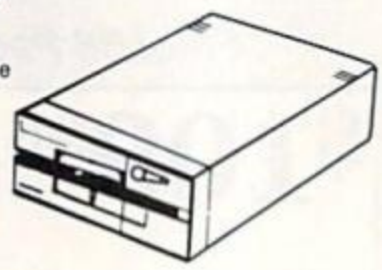

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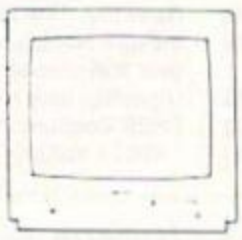

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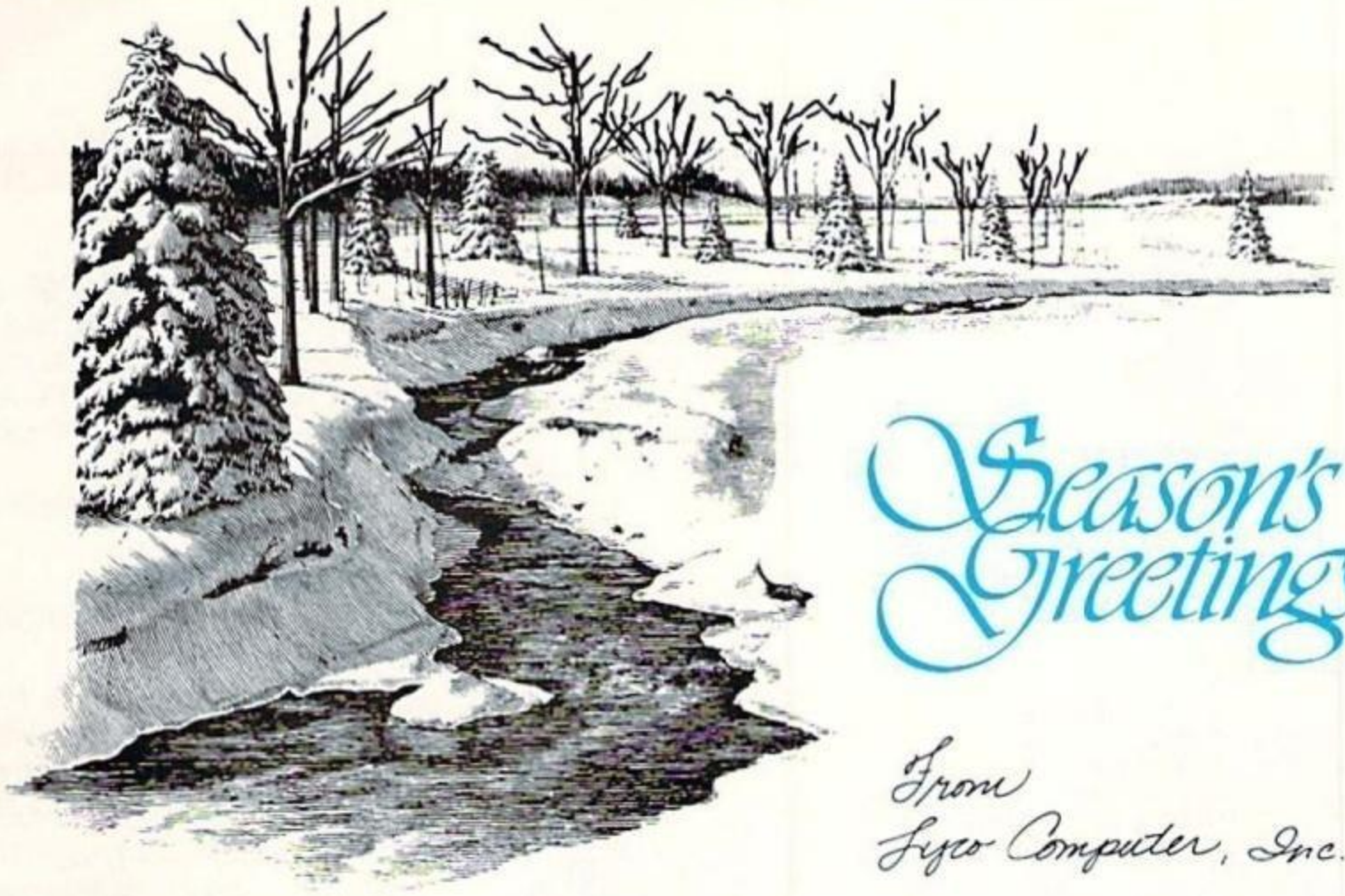

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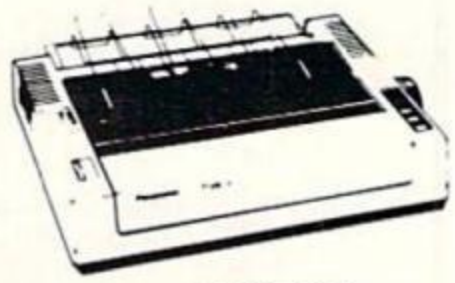

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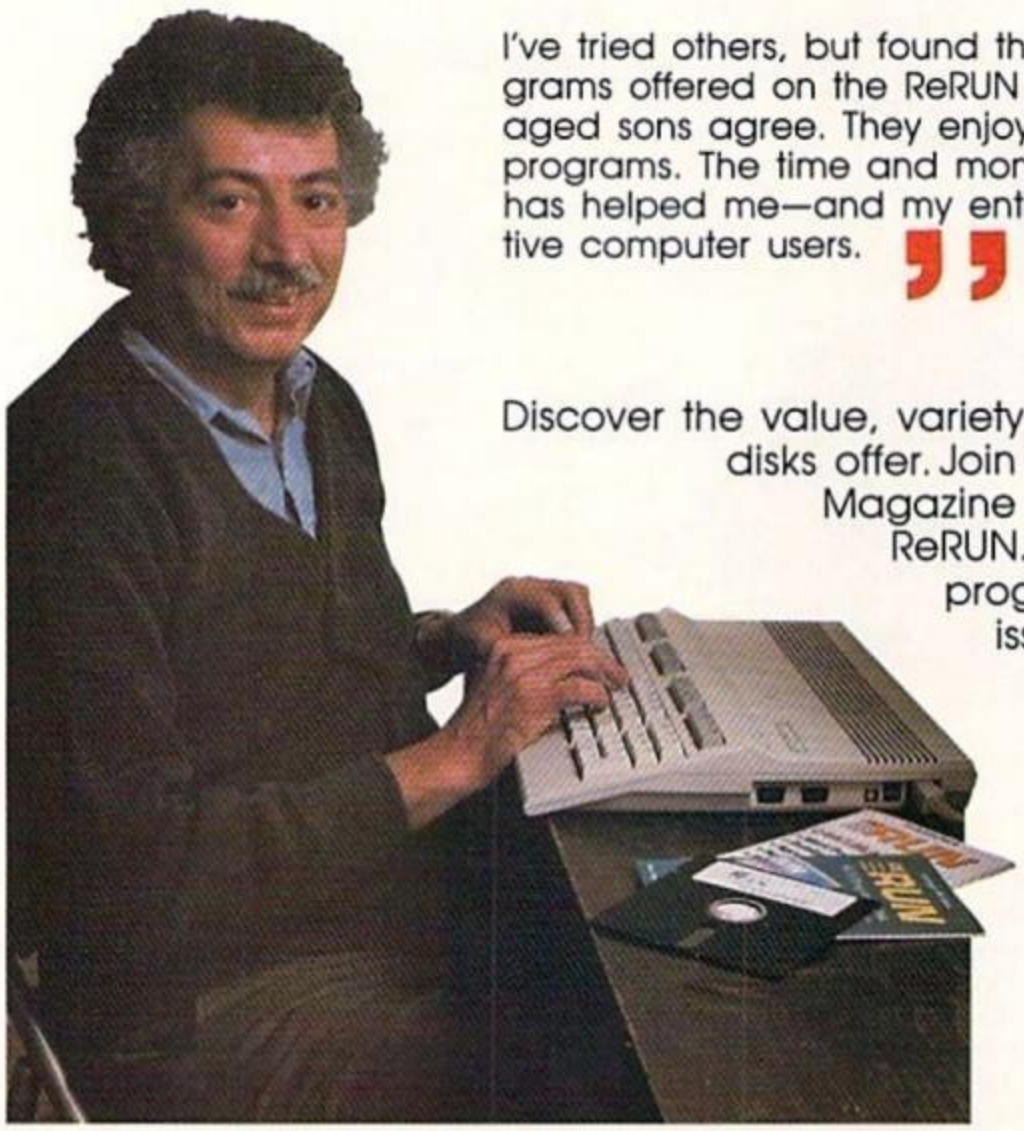

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a failsafe isn't necessary, since RR128 is automatically copied into the REU. Upon exiting, RR128 is cleared from the computer's memory, but remains available by pressing the F6 key whenever you need to find a phone number or address. Should you or another program erase this magic function of the F6 key, you can reaccess RR128 by entering SLOW:FETCH 139,7168,65338,1:RUN, if the REU is a 1700, or SLOW:FETCH 139,7168,65338,7:RUN, if you have a 1750.

RAM Expansion Users Note

While RR128 tries to "stay out of the way" in the REU, other applications may overwrite its area in the highest bank. If so, you'll lose your data, so make sure you resave RR128 to disk after making any changes to your data.

When being retrieved from the REU, RR128 expects the start-of-Basic pointers at locations 45 and 46 to point to location 7169 ($1C01). If you suspect that the start of Basic has been altered or the 40-Column graphics screen has been allocated, you probably should reset the pointers by entering POKE 45,1:POKE 46,28. Ⓡ

Loren Lovhaug, a programmer and writer, is RUN's *Telecomputing Workshop columnist.*

Listing 1. Rolodex Replacer 128 program.

```
1 FAST:COLOR 5,6:COLOR 6,1:GRAP
  HIC 5,1:PRINT"{SHFT G}ETTING
  HAPPY...":DIM D$(5ØØ,6)
                          :REM*18
2 GOSUB 18ØØØ:KEY 6,"SLOW:FETCH
   139,7168,65338,7:RUN"+CHR$(1
  3):LF$="@"              :REM*5Ø
3 XR$(Ø)="128K {SHFT S}YSTEM":X
  R$(1)="256K {SHFT S}YSTEM":XR
  $(2)="64ØK {SHFT S}YSTEM"
                          :REM*17Ø
4 WR=52684:WM=52682:E$=CHR$(27)
  :RESTORE 6              :REM*97
5 SYS WR,49,18:SYS WR,224,19:FO
  R I=Ø TO 7:READ D(I):SYS WM,D
  (I):NEXT:SYS WR,24Ø,19:FOR I=
  7 TO Ø STEP-1:SYS WM,D(I):NEX
  T I                     :REM*51
6 DATA 16,56,124,254,56,56,56,5
  6                       :REM*3Ø
7 FM$="##{SHFT -}##############
  ######{SHFT -}#############{SH
  FT -}##################{SHFT
  -}################{SHFT -}##{S
  HFT -}#####":PRINT CHR$(14)
                          :REM*152
8 RESTORE 9:FOR I= 1 TO 6:READ
  F$(I),FL(I):NEXT I      :REM*21Ø
9 DATA "{SHFT N}AME ",2Ø,"{SHFT
   A}DDRESS ",2Ø,"{SHFT C}ITY "
  ,15,"{SHFT S}TATE ",2,"{SHFT
  Z}IP ",1Ø,"{SHFT P}HONE ",12
                          :REM*13Ø
1Ø POKE 248,128:RV$=CHR$(18):SP
  $="{82 SPACEs}":VB$=CHR$(221
  ):CW=51748:EN$=E$+"K"
                          :REM*255
11 FOR I=1 TO 6:FD$(I)=D$(N-1,I
  ):NEXT I                :REM*159
2Ø OPEN 1,Ø                :REM*91
27 F$="RR128"              :REM*13
99 WINDOW Ø,Ø,79,Ø,1:PRINT RV$;
  "{SHFT R}OLODEXREPLACER 128
  ";XR$(XR);"{8 SPACEs}{SHFT R
  }{SHFT U}{SHFT N} {SHFT M}AG
  AZINE {SHFT N}OV 1988{4 SPAC
  Es}BY {SHFT L}OREN {SHFT L}O
  VHAUG"                  :REM*186
1ØØ SYS CW:WINDOW Ø,1,79,24,1:C
    OLOR 5,8:PRINT"{SHFT M}AIN
    {SHFT M}ENU: ";:COLOR 5,4:P
    RINT"({SHFT B})ROWSE ({SHFT
     F})IND ({SHFT A})DD ({SHFT
     S})AVE {SHFT E}{SHFT S}{SH
     FT C} - {SHFT E}XITS {SHFT
    P}ROGRAM"             :REM*196
1Ø1 COLOR 5,6:PRINT"{11 SPACEs}
    {SHFT P}RESS THE 1ST LETTER
     OF YOUR CHOICE OR {SHFT E}
    {SHFT S}{SHFT C}." :REM*251
1Ø3 M$="BFAS"+E$:GOSUB 13ØØØ:ON
     K GOTO 2ØØØ,3ØØØ,1ØØØ,6ØØØ
    ,19ØØØ                :REM*186
1ØØØ WINDOW Ø,1,79,3,1:PRINT"{S
     HFT T}YPE YOUR NEW ENTRY B
     ELOW.{2 SPACEs}{SHFT Y}OU
     MAY USE SCREEN EDITOR FUNC
     TIONS TO ASSIST YOU.":COLO
     R 5,8                :REM*244
1ØØ5 GOSUB 11ØØØ:FOR F=1 TO 6:G
     OSUB 12ØØØ:FD$(F)=A$:NEXT
     F:COLOR 5,6:SF=Ø     :REM*142
1Ø1Ø WINDOW Ø,13,79,14,1:PRINT"
     {SHFT P}RESS 1ST LETTER OF
      ITEM TO CHANGE (N,A,C,S,Z
     ,P) OR {SHFT R}{SHFT E}{SH
     FT T}{SHFT U}{SHFT R}{SHFT
      N} TO ACCEPT. {SHFT E}{SH
     FT S}{SHFT C} ABORTS":M$="
     NACSZP"+E$+CHR$(13):GOSUB
     13ØØØ                :REM*176
1Ø15 IF K=7 THEN 1ØØ      :REM*76
1Ø2Ø IF K=8 THEN 1Ø35:ELSE F=K:
     GOSUB 12ØØØ          :REM*24
1Ø3Ø FD$(F)=A$:GOTO 1Ø1Ø
                          :REM*157
1Ø35 IF SF>Ø THEN TN=LN:LN=2ØØØ
     Ø+A                  :REM*146
1Ø4Ø L$=STR$(LN)+" DATA ":FOR I
     = 1 TO 6:L$=L$+CHR$(34)+FD
     $(I)+CHR$(34)+CHR$(44):NEX
     T I:L$=LEFT$(L$,LEN(L$)-1)
     :L1$=STR$(LN+1)+" DATA "+C
     HR$(34)+"LAST"+CHR$(34)
                          :REM*135
1Ø45 IF SF>Ø THEN L1$=""
                          :REM*132
1Ø5Ø GRAPHIC Ø,1:PRINT L$:PRINT
      L1$:PRINT"GOTO 1Ø6Ø":POKE
      842,19:FOR I=843 TO 845:P
     OKE I,13:NEXT:POKE 2Ø8,4:S
     TOP                  :REM*211
1Ø6Ø IF SF>Ø THEN GRAPHIC 5:LN=
     TN:FOR I= 1 TO 6:D$(A,I)=F
     D$(I):NEXT I:GOTO 1ØØ
                          :REM*119
1Ø61 GRAPHIC 5:LN=LN+1:FOR I=1
     TO 6:D$(N,I)=FD$(I):NEXT I
     :N=N+1:GOTO 1ØØ      :REM*5
2ØØØ IF N=1 THEN COLOR 5,3:PRIN
     T:PRINT"{SHFT N}O DATA CUR
     RENTLY DEFINED...{SHFT P}R
     ESS ANY KEY TO CONTINUE.":
     GETKEYZ$:GOTO 1ØØ :REM*163
2ØØ5 GRAPHIC 5,1:WINDOW Ø,5,79,
     24,1:COLOR 5,3:PRINT RV$;L
     EFT$(SP$,8Ø):COLOR 5,6
                          :REM*98
2Ø1Ø IF N<7 THEN S=1:E=N-1:FO=3
     :GOSUB 14ØØØ:COLOR 5,3:PRI
     NT RV$;LEFT$(SP$,8Ø):PRINT
     "{SHFT P}RESS ANY KEY TO R
     ETURN TO {SHFT M}AIN {SHFT
      M}ENU.":GETKEY Z$:GOTO 1Ø
     Ø                    :REM*1Ø4
2Ø2Ø S=1:E=5:GOSUB 14ØØØ:COLOR
     5,3:PRINT RV$;LEFT$(SP$,8Ø
     ):TD=1:BD=5:COLOR5,8
                          :REM*131
2Ø3Ø PRINT"{SHFT P}RESS {UP ARR
     OW} OR {LEFT ARROW} TO SCR
     OLL DATA.{2 SPACEs}{SHFT P
     }RESS {SHFT E}{SHFT S}{SHF
     T C} TO RETURN TO MAIN MEN
     U."                  :REM*1Ø5
2Ø4Ø COLOR 5,6:SYS CW:WINDOW Ø,
     6,79,1Ø,Ø:M$="{CRSR UP}{CR
     SR DN}"+E$:DO:GOSUB 13ØØØ:
     IF K=3 THEN EXIT:ELSE ON K
      GOSUB 15ØØØ,16ØØØ:REM*2ØØ
2Ø5Ø LOOP:GOTO 1ØØ        :REM*22Ø
3ØØØ WINDOW Ø,1,79,24,1:PRINT"{
     SHFT P}RESS THE FIRST LETT
     ER OF THE FIELD YOU TO SEA
     RCH YOUR DATA ON.{2 SPACEs
     }{SHFT E}{SHFT S}{SHFT C}
     ABORTS.":COLOR 5,8 :REM*82
3Ø1Ø PRINT"({SHFT N})AME{3 SPAC
     Es}({SHFT A})DDRESS{3 SPAC
     Es}({SHFT C})ITY{3 SPACEs}
     ({SHFT S})TATE{3 SPACEs}({
     SHFT Z})IP{3 SPACEs}({SHFT
      P})HONE{3 SPACEs}{SHFT E}
     {SHFT S}{SHFT C}" :REM*232
3Ø2Ø M$="NACSZP"+E$:GOSUB 13ØØØ
     :IF K=7 THEN 1ØØ  :REM*227
3Ø3Ø SCNCLR:PRINT"{SHFT E}NTER
     SEARCH DATA FOR ";F$(K);"B
     ELOW:":S=K:F=K:GOSUB 11ØØØ
     :GOSUB 12ØØØ:SYS CW:WINDOW
      Ø,1,79,24,1:COLOR 5,4
                          :REM*182 ►
```


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```
3Ø4Ø FF=Ø:POKE 248,Ø:FOR I= 1 T
     O N:IF INSTR(D$(I,K),A$) T
     HEN S=I:E=I:GOSUB 14ØØØ:FF
     =1                    :REM*235
3Ø5Ø NEXT I:IF FF=Ø THEN PRINT
     A$;" NOT FOUND IN ";F$(K):
     PRINT "{SHFT P}RESS A KEY
     TO RETURN TO MENU.":GETKEY
      Z$:POKE 248,128:GOTO 1ØØ
                           :REM*8
3Ø6Ø POKE 248,128:COLOR 5,6:PRI
     NT RV$;LEFT$(SP$,8Ø):COLOR
      5,8:PRINT"({SHFT C})HANGE
     {2 SPACEs}({SHFT D})ELETE{
     2 SPACEs}{SHFT E}{SHFT S}{
     SHFT C}"              :REM*47
3Ø7Ø M$="CD"+E$:GOSUB 13ØØØ:ON
     K GOTO 4ØØØ,5ØØØ,1ØØ
                           :REM*64
4ØØØ PRINT"{SHFT E}NTER THE NUM
     BER OF THE ITEM YOU WISH T
     O CHANGE AND PRESS RETURN:
     ";:POKE 5,1:SYS 6552Ø:RREG
      A,Y,X                :REM*134
4Ø1Ø WINDOW X+1,Y+1,X+5,Y+1,1:I
     NPUT#1,A:IF A<1 OR A>(N-1)
      THEN 4Ø1Ø            :REM*55
4Ø2Ø SYS CW:WINDOW Ø,1,79,24,1:
     SYS CW:GOSUB 11ØØØ:GOSUB 1
     7ØØØ:SF=1:GOTO 1Ø1Ø
                          :REM*142
5ØØØ PRINT"{SHFT E}NTER THE NUM
     BER OF THE ITEM YOU WISH T
     O DELETE AND PRESS RETURN:
     ";:POKE 5,1:SYS 6552Ø:RREG
      A,Y,X               :REM*127
5Ø1Ø WINDOW X+1,Y+1,X+5,Y+1,1:I
     NPUT#1,A:IF A<1 OR A>(N-1)
      THEN 5Ø1Ø           :REM*9Ø
5Ø2Ø SYS CW:WINDOW Ø,1,79,24,1:
     SYS CW:GOSUB 11ØØØ:GOSUB 1
     7ØØØ                 :REM*1Ø4
5Ø3Ø SYS CW:WINDOW Ø,13,79,13,1
     :COLOR 5,3:PRINTCHR$(15);"
     {SHFT W}ARNING: ";CHR$(143
     );:COLOR5,8:PRINT"{SHFT Y}
     OU ARE ABOUT TO DELETE THI
     S ITEM.{2 SPACEs}{SHFT P}R
     ESS ! TO CONFIRM.":REM*168
5Ø4Ø GETKEY Z$:IF Z$<>"!" THEN
     1ØØ:ELSE COLOR 5,5:PRINT "
     {SHFT D}ELETING ITEM AND R
     ETHINKING THE NATURE OF TH
     INGS... {SHFT P}LEASE BE P
     ATIENT."              :REM*68
5Ø5Ø GRAPHIC Ø,1:PRINT "DELETE"
     ;2ØØØØ+A;":RENUMBER 2ØØØØ,
     1,2ØØØØ"              :REM*195
5Ø6Ø POKE 842,19:POKE 843,13:Z$
     ="G{SHFT O}5Ø7Ø":FOR I=1 T
     O 6:POKE I+843,ASC(MID$(Z$
     ,I,1)):NEXT I:POKE 85Ø,13:
     POKE 2Ø8,9:STOP       :REM*1Ø6
5Ø7Ø GRAPHIC 5:GOSUB 18ØØØ:GOTO
      1ØØ                  :REM*11Ø
6ØØØ SYS CW:WINDOW Ø,1,79,24,1:
     COLOR 5,8             :REM*8Ø
6Ø1Ø PRINT"{SHFT E}NTER THE NAM
     E TO USE FOR THIS SAVE AND
      PRESS RETURN:";      :REM*147
6Ø2Ø SYS CW:WINDOW 54,1,7Ø,1,1:
     PRINT F$;E$;"K":INPUT#1,NF
     $:SYS CW:WINDOW Ø,2,79,2,1
     :COLOR 5,6            :REM*35
6Ø3Ø Z$="{SHFT E}NTER THE UNIT
     TO WHICH YOU WISH TO SAVE
     "+NF$+":":PRINT Z$:REM*2Ø9
6Ø4Ø SYS CW:WINDOW LEN(Z$)+1,2,
     LEN(Z$)+17,2,1:INPUT#1,U:I
     F U<8 OR U>11 THEN 6Ø4Ø
                           :REM*16Ø
6Ø5Ø SYS CW:WINDOW Ø,1,79,24,1:
     IF NF$=F$ THEN SCRATCH (F$
     ) ON U(U)             :REM*126
```

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```
6ØóØ PRINT"{SHFT S}AVING ";NF$:
     GRAPHIC Ø,1:PRINT "DSAVE (
     NF$) ON U";U;":GOTO 6Ø7Ø":
     POKE 842,19:POKE 843,13:PO
     KE 2Ø8,2:STOP       :REM*33
6Ø7Ø IF NF$=F$ THEN 6Ø9Ø:ELSE G
     RAPHIC Ø,1:PRINT "27 F$=";
     CHR$(34);NF$;CHR$(34)
                         :REM*84
6Ø8Ø POKE 842,19:POKE 843,13:Z$
     ="G{SHFT O}6Ø9Ø":FOR I=1 T
     O 6:POKE I+843,ASC(MID$(Z$
     ,I,1)):NEXT I:POKE 85Ø,13:
     POKE 2Ø8,9:STOP    :REM*219
6Ø9Ø GRAPHIC 5:COLOR 5,4:SYS CW
     :WINDOW Ø,1,79,24,1:POKE 2
     48,Ø:DIRECTORY ON U(U):PRI
     NT:PRINT"{SHFT P}RESS ANY
     KEY TO CONTINUE":POKE 248,
     128:GETKEY Z$:GOTO 1ØØ
                         :REM*3Ø
11ØØØ FOR I= 1 TO 6:WINDOW 24+(
     1Ø-LEN(F$(I))),4+I,55,4+I
     ,1:PRINT F$(I);VB$;LEFT$(
     SP$,FL(I));VB$:NEXT I:SYS
      CW:RETURN          :REM*25Ø
12ØØØ A$="":POKE248,128:FL=1Ø-L
     EN(F$(F)):WINDOW24+FL,4+F
     ,34,4+F,Ø:PRINTRV$;F$(F):
     WINDOW 35,4+F,34+FL(F),4+
     F,Ø:PRINTEN$:INPUT#1,A$:I
     FA$=LF$ THENA$=FD$(F):PRI
     NTA$               :REM*124
12ØØ1 WINDOW 24+FL,4+F,34,4+F,Ø
     :PRINT F$(F):SYS CW:RETUR
     N                  :REM*219
13ØØØ K=Ø:DO UNTIL K<>Ø:GETKEY
     K$:K=INSTR(M$,K$):LOOP:RE
     TURN               :REM*171
14ØØØ FOR Z=S TO E:PRINT USING
     FM$;Z,D$(Z,1),D$(Z,6),D$(
     Z,2),D$(Z,3),D$(Z,4),D$(Z
     ,5):NEXT Z:RETURN:REM*217
15ØØØ IF (TD-1)>Ø THEN TD=TD-1:
     BD=BD-1:S=TD:E=TD:ELSE RE
     TURN                :REM*4
15ØØ1 SYS 51914:SYS CW:WINDOW Ø
     ,6,79,6,1:GOSUB 14ØØØ:SYS
      CW:WINDOW Ø,6,79,1Ø,Ø:RE
     TURN               :REM*111
16ØØØ IF (BD+1)<N THEN BD=BD+1:
     TD=TD+1:S=BD:E=BD:ELSE RE
     TURN               :REM*2Ø8
16ØØ1 SYS 519ØØ:SYS CW:WINDOW Ø
     ,1Ø,79,1Ø,1:GOSUB 14ØØØ:S
     YS CW:WINDOW Ø,6,79,1Ø,Ø:
     RETURN             :REM*65
17ØØØ SYS CW:FOR I= 1 TO 6:CHAR
      1,35,4+I,D$(A,I),Ø:FD$(I
     )=D$(A,I):NEXT I:RETURN
                         :REM*29
18ØØØ N=Ø:RESTORE 2ØØØØ:DO:N=N+
     1:READ D$(N,1):IF D$(N,1)
     ="LAST" THEN EXIT:REM*11Ø
18ØØ1 FOR I=2 TO 6:READ D$(N,I)
     :NEXT I:LOOP:LN=N+2ØØØØ
                         :REM*94
1811Ø DATA"ØØ 89 1C ØA ØØ DE 2Ø
      3Ø 2C 31 3A 99 22 53 4C
      4F"               :REM*8Ø
18111 DATA"57 3A 46 45 54 43 48
      2Ø 32 2C 34 36 32 34 2C
      36"               :REM*116
18112 DATA"35 33 33 36 2C 37 3A
      45 42 3D 28 5Ø 45 45 4B
      28"               :REM*142
18113 DATA"34 36 32 35 29 2A 32
      35 36 29 2B 5Ø 45 45 4B
      28"               :REM*86
18114 DATA"34 36 32 34 29 3A 46
      4C 3D 45 42 2D 37 31 36
      38"               :REM*9Ø
18115 DATA"3A 46 45 54 43 48 2Ø
      46 4C 2C 37 31 36 38 2C
      36"               :REM*97
18116 DATA"35 33 33 35 2D 46 4C
      2C 37 3A 52 55 4E 22 3A
      97"               :REM*218
18117 DATA"2Ø 38 34 32 2C 31 39
      3A 97 2Ø 38 34 33 2C 31
      33"               :REM*212
18118 DATA"3A 97 2Ø 32 3Ø 38 2C
      32 ØØ ØØ ØØ"     :REM*91
182ØØ SLOW:AR=57Ø94:POKE AR,255
     :IF PEEK(AR)<>255 THEN XR
     =Ø:RETURN          :REM*28
1821Ø POKE AR,Ø:AR=57Ø88:XR=1:I
     F (PEEK(AR) AND 16) THEN
     XR=2               :REM*244
1823Ø IF XR=1 THEN SB=1:ELSE SB
     =7                 :REM*197
18235 SLOW:FETCH 139,2816,65338
     ,SB:FAST:IF PEEK(2817)=13
     7 AND PEEK(2951)=5Ø THEN
     RETURN             :REM*Ø
1824Ø Q=2815:RESTORE 1811Ø:FOR
     I=1 TO 9:READ D$:FOR J= 1
      TO LEN(D$) STEP 3:Q=Q+1:
     POKE Q,DEC(MID$(D$,J,2)):
     NEXT:NEXT          :REM*5
1825Ø SLOW:STASH 139,2816,65338
     ,SB:FAST:RETURN    :REM*63
19ØØØ SLOW:STASH 2,4624,65336,S
     B:EB=(PEEK(4625)*256)+PEE
     K(4624):FL=EB-7168:STASH
     FL,7168,65335-FL,SB
                        :REM*137
19999 SYS CW:GRAPHIC 5,1:POKE 2
     48,Ø:IF XR>Ø THEN NEW:END
     :ELSE END          :REM*22Ø
2ØØØØ REM FROM HERE ON IS WHERE
      YOUR DATA GETS TACKED ON
                        :REM*55
2ØØØ1 DATA "LAST"        :REM*Ø
```

■

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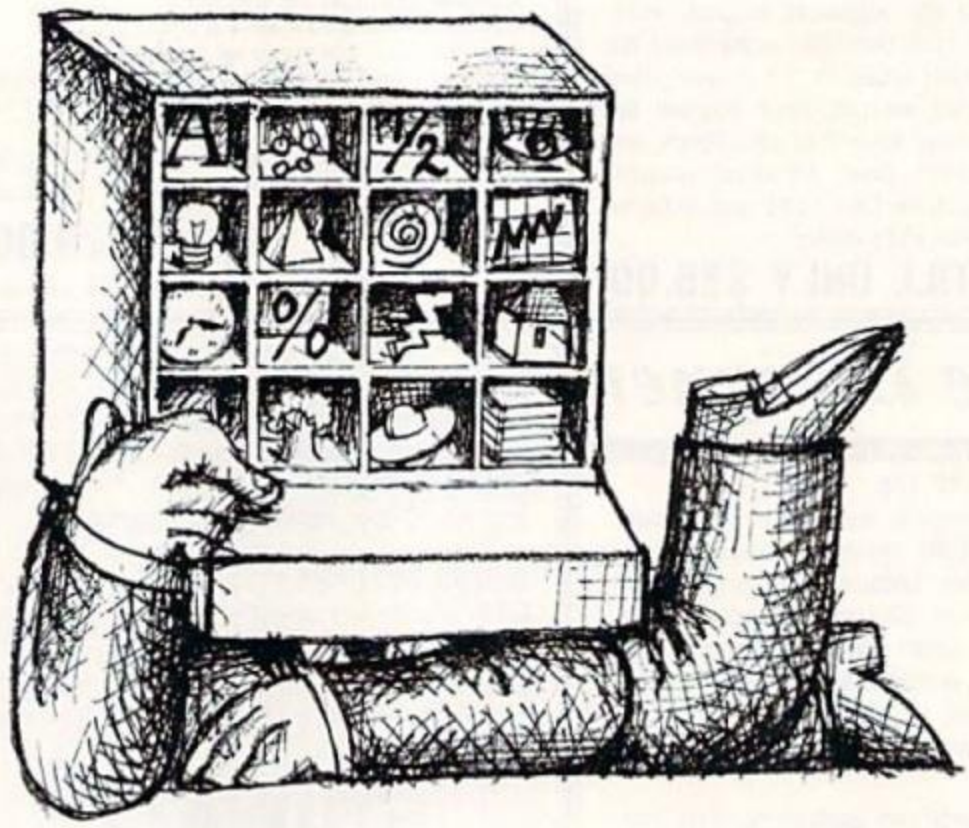
GEOWATCH

Make a personal statement by transforming GEOS's deskTop icons with this editor.

By WAYNE DEMPSEY



MY ICON EDITER PROGRAM (spelled Edit*er* because Icon Edit*or* is a trademark of Berkeley Softworks) lets you change and personalize almost any icon on the GEOS deskTop. The only one you cannot alter is the Commodore icon, because its picture is stored internally.

Creating Icon Editer

The listing for Icon Editer is simple and straightforward. When typing the Data statements, be sure to remember the spaces between the numbers. Also, it's a wise idea to use *RUN*'s Checksum program to verify your input.

Before you run Icon Editer, save a copy to a backup disk. After you load the program, it tells you to insert a blank disk. When you're prompted to confirm the fact that you want to format the disk, answer Y, and Icon Editer will take about ten minutes to save a binary version of itself to disk.

Next, boot GEOS and open the disk. When the prompt appears, convert the disk to GEOS format. The Icon Editer is now ready for use.

Working with Icon Editer

To enter Icon Editer, double-click its icon on the deskTop. The Icon Editer screen appears, along with a dialog box asking for the filename of the icon you want to change.

At the bottom of the dialog box are two icons—Cancel and Disk. Cancel reloads the deskTop; Disk lets you insert a new disk. *Do not* switch disks without first clicking on the Disk icon.

After you type the filename of the icon you want to edit, the icon is loaded from the current disk. An enlarged picture of the icon appears in the center of the screen, with an actual-size icon shown at the right. You change the icon by pressing the mouse button and moving the pointer through the large pixel-picture. Pressing the button also lets you toggle between Draw and Erase. The pointer turns black to draw and pink to erase.

The File Menu icon gives you three options: Save, Recover or Quit. Any changes to the edited icon are temporary until you choose Save. Choosing Recover restores the original icon, and Quit reloads the deskTop without saving the icon.

Since changes are permanent after you choose Save, be careful not to accidentally erase an important icon. R

Wayne Dempsey is a high school honor student, currently in his junior year, who particularly enjoys working with GEOS.

Send your questions on GEOS to: geoWatch, RUN Magazine, 80 Elm St., Peterborough, NH 03458.

Listing 1. Icon Editer program.

```
1 REM BASIC LOADER FOR ICON EDI
  TER                    :REM*229
2 REM WAYNE DEMPSEY      :REM*174
3 PRINT"PLEASE WAIT APPROXIMATE
  LY 6 MINUTES           :REM*235
4 PRINT"INSERT A FORMATTED DISK
  ":WAIT198,1:OPEN15,8,15,"IØ:"
  :INPUT#15,A            :REM*46
5 IF A=ØTHEN PRINT"DISK HAS DAT
  A ON IT...CONTINUE (Y)?":POKE
  198,Ø:GOTO7             :REM*8
6 GOTO1Ø                 :REM*128
7 GETA$:IFA$=""THEN7     :REM*151
8 IFA$="Y"THEN1Ø         :REM*216
9 END                    :REM*137
1Ø T=1:FORY=1TO1869:GOSUB19:Z=Z
  +C:NEXTY:IFZ<>168646THENPRIN
  T"ERROR IN DATA":END :REM*48
11 RESTORE:PRINT#15,"NØ:ICON ED
  ITER,ØØ":PRINT#15,"B-A:";Ø;1
  ;1:OPEN5,8,5,"#"       :REM*23Ø
12 PRINT#15,"B-A:";Ø;1;1:REM*59
13 PRINT#15,"U1:";5;Ø;1;1:FORZ=
  ØTO255:GOSUB19:PRINT#5,CHR$(
  C);:NEXT               :REM*122
14 PRINT#15,"U2:";5;Ø;1;1:CLOSE
  5:OPEN5,8,5,"ICON EDITER,P,W
  "                      :REM*122
15 FORZ=1TO1613:GOSUB19:PRINT#5
  ,CHR$(C);:NEXT:CLOSE5:OPEN5,
  8,5,"#"                :REM*23Ø
16 PRINT#15,"U1:";5;Ø;18;1:PRIN
  T#5,CHR$(Ø);CHR$(255);CHR$(1
  31);                   :REM*222
17 PRINT#15,"B-P";5;21:PRINT#5,
  CHR$(1);CHR$(1);CHR$(Ø);CHR$
  (6);                   :REM*64
18 PRINT#15,"U2:";5;Ø;18;1:CLOS
  E5:CLOSE15:END         :REM*167
19 IFT=1THENREADA$       :REM*121
2Ø Z$=MID$(A$,T,2):C=Ø:FORX=1TO
  2:W$=MID$(Z$,X,1)      :REM*185
21 IFASC(W$)<58ANDASC(W$)>47THE
  NB=ASC(W$)-48          :REM*16Ø
22 IFASC(W$)<71ANDASC(W$)>64THE ►
```

RUN it right: **C-64; GEOS**

ILLUSTRATED BY MACIEK ALBRECHT

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Flight notes # 2E

Wrapping Up Europe - The deadline for entering our "Find Red Square" contest was November 15th, 1988. Current plans call for a mid-December drawing to determine the contest winner. This contest, requiring you to use **Flight Simulator** or **Jet** to locate Red Square on our new **"Western European Tour" Scenery Disk,** was as much fun for us as it was for you! Watch for another Scenery Disk promo contest next year.

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Its Back! Not advertised since early 1984, the classic **Night Mission Pinball** will be back in production once again by the time you read this. Priced at only $29.95, now everyone can afford to add this classic to their software collection. If you're a family person like myself, be prepared to be without your computer for extended periods of time. Pinball's uncanny realism and general appeal has a way of captivating everyone.

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```
   NB=ASC(W$)-55              :REM*92
23 IFJ=ØTHENC=B*16:J=1:GOTO25
                              :REM*25
24 C=C+B:J=Ø                  :REM*13
25 NEXTX:T=T+3:IFT=64THENT=1
                              :REM*14
26 RETURN                     :REM*168
1ØØ DATA ØØ FF Ø3 15 BF FF FF F
    F 95 55 55 FA AA AB D5 55 5
    5 AA AA AB D7             :REM*67
1Ø1 DATA FF D5 AA 23 6B D7 E3 5
    5 82 ØØ 6B BA FE 55 BA 82 6
    B BA 82 55 82            :REM*18Ø
1Ø2 DATA C2 6B D6 FE 55 AA ØØ 6
    B D7 FF D5 AA AA AB D5 55 5
    5 AA AA AB D5              :REM*7
1Ø3 DATA 55 55 FF FF FF 83 Ø6 Ø
    Ø ØØ Ø4 Ø1 Ø4 ØØ Ø4 49 63 6
    F 6E 2Ø 45 64            :REM*11Ø
1Ø4 DATA 69 74 65 72 2Ø 56 31 2
    E 3Ø ØØ ØØ ØØ ØØ 57 61 79 6
    E 65 2Ø 44 65            :REM*165
1Ø5 DATA 6D 7Ø 73 65 79 ØØ ØØ Ø
    Ø ØØ ØØ ØØ ØØ ØØ ØØ ØØ Ø
    Ø ØØ ØØ ØØ ØØ            :REM*118
1Ø6 DATA ØØ ØØ ØØ ØØ ØØ ØØ ØØ Ø
    Ø ØØ ØØ ØØ A9 34 85 ØF A9 6
    D 85 ØE 2Ø Ø6            :REM*92
1Ø7 DATA Ø4 2Ø ØB C2 2Ø Ø6 Ø4 8
    A DØ 2F 18 A9 1C 55 73 65 2
    Ø 74 68 65 2Ø            :REM*195
1Ø8 DATA 49 63 6F 6E 2Ø 45 64 6
    9 74 65 72 2Ø 74 6F 2Ø 63 7
    5 73 74 6F 6D             :REM*35
1Ø9 DATA 69 7A 65 2Ø 79 6F 75 7
    2 2Ø 6F 77 6E 2Ø 47 45 4F 5
    3 2Ø 69 63 6F            :REM*226
11Ø DATA 6E 73 2E ØØ Ø2 A6 Ø2 A
    D CD 3A 85 Ø9 AD CC 3A 85 Ø
    8 DØ 22 AD AF            :REM*13Ø
111 DATA 39 85 Ø8 AD BØ 39 85 Ø
    9 2Ø Ø6 Ø4 2Ø 92 C2 2Ø Ø6 Ø
    4 8A DØ 4Ø A6            :REM*115
112 DATA Ø2 A5 Ø8 9D 2Ø ØD Ø4 2
    Ø BC Ø4 2Ø A4 Ø4 2Ø BC Ø5 6
    Ø 2Ø A8 C1 Ø1            :REM*239
113 DATA ØØ ØØ ØØ Ø5 Ø2 Ø3 3F Ø
    1 C7 Ø1 58 ØØ 2Ø Ø5 ØØ Ø3 E
    A ØØ AØ Ø7 58            :REM*254
114 DATA ØØ 2Ø Ø1 59 ØØ 21 Ø7 E
    9 ØØ 9F Ø1 39 ØØ 52 Ø5 ØØ Ø
    3 1E ØØ 6A Ø7            :REM*113
115 DATA 39 ØØ 52 ØØ A9 ØØ 85 7
    1 A9 5F 85 7Ø A9 2Ø 85 Ø8 A
    9 A1 85 Ø9 A5            :REM*212
116 DATA 71 85 ØB A5 7Ø 85 ØA A
    9 FF 2Ø 21 C1 A5 71 C9 ØØ D
    Ø Ø4 A5 7Ø C9            :REM*145
117 DATA E3 FØ ØE 18 A9 Ø6 65 7
    Ø 85 7Ø 9Ø Ø2 E6 71 B8 5Ø D
    9 A9 27 85 7Ø             :REM*59
118 DATA A9 ØØ 85 Ø9 A9 58 85 Ø
    8 A9 ØØ 85 ØB A9 EB 85 ØA A
    5 7Ø 85 18 A9            :REM*2Ø5
119 DATA FF 2Ø 18 C1 A5 7Ø C9 9
    9 FØ ØA A5 7Ø 18 69 Ø6 85 7
    Ø B8 5Ø E7 6Ø             :REM*97
12Ø DATA A9 Ø4 85 Ø3 A9 BØ 85 Ø
    2 2Ø 5A C1 6Ø Ø1 ØØ ØØ ØØ Ø
    Ø ØØ ØØ ØØ Ø1             :REM*146
121 DATA Ø1 ØØ ØØ A9 Ø4 85 Ø3 A
    9 C8 85 Ø2 2Ø 51 C1 6Ø ØØ Ø
    C ØØ ØØ 14 ØØ             :REM*88
122 DATA Ø1 EF Ø4 8Ø D4 Ø4 ØC 4
    5 ØØ ØØ 43 ØØ 84 F4 Ø4 ØØ 1
    C Ø5 ØØ Ø5 ØØ             :REM*37
123 DATA 2B Ø5 ØA Ø5 ØØ 52 Ø5 1
    7 Ø5 ØØ 5F Ø5 66 69 6C 65 Ø
    Ø 45 64 69 74             :REM*27
124 DATA 6F 72 2Ø 69 6E 66 6F Ø
    Ø 73 61 76 65 2Ø 69 63 6F 6
    E ØØ 72 65 63              :REM*9
125 DATA 6F 76 65 72 2Ø 69 63 6
    F 6E ØØ 71 75 69 74 ØØ 2Ø B
    D C1 A9 Ø5 85            :REM*223
126 DATA Ø3 A9 65 85 Ø2 2Ø 56 C
    2 6Ø 2Ø BD C1 A2 ØØ 2Ø ØC C
    1 AD ØØ 83 85            :REM*117
127 DATA Ø4 AD Ø1 83 85 Ø5 A9 8
    1 85 ØB A9 ØØ 85 ØA 2Ø E7 C
    1 A9 Ø7 85 Ø8             :REM*87
128 DATA 2Ø D5 C1 4C BC Ø5 2Ø B
    D C1 2Ø ØC C1 2Ø 48 Ø6 2Ø Ø
    F C1 6Ø 2Ø BD            :REM*243
129 DATA C1 4C 2C C2 81 ØB 3C 1
    4 7C Ø5 ØB 45 25 8A Ø5 ØB 3
    4 38 96 Ø5 ØB             :REM*1Ø
13Ø DATA 2A 5A A5 Ø5 ØE ØØ 1A 4
    9 63 6F 6E 2Ø 45 64 69 74 6
    5 72 1B ØØ 1B             :REM*32
131 DATA 43 72 65 61 74 65 64 2
    Ø 62 79 ØØ 18 57 61 79 6E 6
    5 2Ø 44 65 6D             :REM*6
132 DATA 7Ø 73 65 79 ØØ 1B 28 4
    3 29 2Ø 31 39 38 38 2Ø 52 5
    5 4E 2Ø 4D 61            :REM*17Ø
133 DATA 67 61 7A 69 6E 65 ØØ 2
    Ø A1 C2 A9 ØØ 8D AØ 82 2Ø B
    4 C1 1Ø ØØ Ø2            :REM*192
134 DATA Ø7 ØØ A9 Ø6 85 Ø3 A9 E
    6 85 Ø2 A9 Ø7 85 ØD A9 Ø2 8
    5 ØC 2Ø 56 C2             :REM*54
135 DATA A5 Ø2 C9 Ø2 FØ Ø7 C9 Ø
    6 FØ Ø6 4C 48 Ø6 4C 2C C2 A
    9 Ø5 85 Ø3 A9             :REM*52
136 DATA FD 85 Ø2 2Ø 56 C2 4C B
    C Ø5 81 ØB 1E 28 15 Ø6 ØE Ø
    Ø 18 43 75 72             ◂REM*26
137 DATA 72 65 6E 74 2Ø 44 69 7
    3 6B 3A 1B ØØ 18 5Ø 6C 65 6
    1 73 65 2Ø 49            :REM*198
138 DATA 6E 73 65 72 74 2Ø 41 2
    Ø 4E 65 77 2Ø 44 69 73 6B 1
    B ØØ 81 ØB 34            :REM*21Ø
139 DATA 28 38 Ø6 ØE ØØ 18 46 6
    9 6C 65 2Ø 4E 6F 74 2Ø 46 6
    F 75 6E 64 ØØ             :REM*82
14Ø DATA A9 Ø7 85 ØF A9 Ø2 85 Ø
    E 2Ø ØB C2 EØ Ø5 DØ ØE A9 Ø
    6 85 Ø3 A9 3Ø            :REM*1Ø7
141 DATA 85 Ø2 2Ø 56 C2 4C BC Ø
    5 A9 84 85 15 A9 ØØ 85 14 2
    Ø 29 C2 2Ø 5C             :REM*36
142 DATA C2 A9 Ø6 8D 2E DØ 2Ø 5
    F C2 A9 Ø7 85 Ø8 A9 81 85 Ø
    B A9 Ø5 85 ØA             :REM*188
143 DATA 2Ø C6 C1 A9 ØØ 85 ØB A
    9 2Ø 85 ØA A9 54 85 ØC 2Ø C
```


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GEOWATCH

```
     F C1 2Ø D2 C1          :REM*3
144 DATA A9 Ø1 8D 2E Ø7 A9 ØØ 8
     D 2F Ø7 2Ø 8Ø Ø7 2Ø 32 Ø7 2
     Ø A1 Ø7 AD 2F          :REM*35
145 DATA Ø7 C9 14 FØ Ø6 EE 2F Ø
     7 B8 5Ø EA AD 2E Ø7 C9 Ø3 F
     Ø Ø6 EE 2E Ø7          :REM*6
146 DATA B8 5Ø D8 A9 Ø8 8D AA 8
     4 A9 14 8D A9 84 A9 Ø8 85 Ø
     3 A9 6F 85 Ø2          :REM*235
147 DATA A9 Ø1 2Ø Ø3 C1 A2 ØØ 2
     Ø Ø6 C1 6Ø 81 ØB ØA ØA Ø5 Ø
     6 ØB 5Ø ØA 9Ø          :REM*4
148 DATA 82 ØB ØA 1E 13 Ø7 ØD Ø
     A 32 ØC 1Ø Ø2 Ø1 48 Ø6 11 4
     8 ØØ ØØ ØØ ØØ         :REM*186
149 DATA ØØ ØØ ØØ ØØ ØØ ØØ ØØ Ø
     Ø ØØ ØØ ØØ ØØ ØØ ØØ 18 5Ø 6
     C 65 61 73 65          :REM*216
15Ø DATA 2Ø 54 79 7Ø 65 2Ø 46 6
     9 6C 65 6E 61 6D 65 3A 1B Ø
     Ø ØØ ØØ ØØ ØØ          :REM*125
151 DATA ØØ ØØ ØØ AE 2E Ø7 EØ Ø
     1 FØ Ø9 EØ Ø2 FØ ØD EØ Ø3 F
     Ø 11 6Ø A9 5B          :REM*5
152 DATA 8D 2B Ø7 B8 5Ø 1Ø A9 8
     B 8D 2B Ø7 B8 5Ø Ø8 A9 BB 8
     D 2B Ø7 B8 5Ø          :REM*59
153 DATA ØØ AC 2F Ø7 8C 3Ø Ø7 A
     Ø ØØ A2 Ø3 CC 3Ø Ø7 FØ ØA E
     8 E8 E8 E8 E8          :REM*83
154 DATA E8 C8 B8 5Ø F1 8E 2D Ø
     7 AD 2D Ø7 18 69 2Ø 8D 2D Ø
     7 6Ø A2 ØØ AØ          :REM*142
155 DATA ØØ CC 2F Ø7 FØ Ø7 E8 E
     8 E8 C8 B8 5Ø F4 AØ Ø1 CC 2
     E Ø7 FØ Ø5 E8          :REM*33
156 DATA C8 B8 5Ø F6 8E 31 Ø7 6
     Ø ØØ A9 ØØ 8D 3Ø Ø7 AE 31 Ø
     7 BD Ø5 81 2A          :REM*26
157 DATA 8D AØ Ø7 9Ø Ø8 A9 Ø1 2
     Ø 39 C1 B8 5Ø Ø5 A9 ØØ 2Ø 3
     9 C1 AD 2C Ø7          :REM*79
158 DATA 85 Ø9 AD 2B Ø7 85 Ø8 A
     D 2C Ø7 85 ØB AD 2B Ø7 85 Ø
     A AD 2D Ø7 85          :REM*12
159 DATA Ø6 AD 2D Ø7 85 Ø7 18 A
     9 Ø2 65 ØA 85 ØA 9Ø Ø2 E6 Ø
     B A5 Ø7 18 69          :REM*118
16Ø DATA Ø2 85 Ø7 2Ø 24 C1 EE 3
     Ø Ø7 AD 3Ø Ø7 C9 Ø8 FØ 14 1
     8 A9 Ø6 6D 2B          :REM*152
161 DATA Ø7 8D 2B Ø7 9Ø Ø3 EE 2
     C Ø7 AD AØ Ø7 B8 5Ø 9C 6Ø Ø
     Ø ØØ ØØ A9 2Ø          :REM*148
162 DATA 85 Ø6 A9 AØ 85 Ø7 A9 Ø
     Ø 85 Ø9 A9 58 85 Ø8 A9 ØØ 8
     5 ØB A9 EB 85          :REM*251
163 DATA ØA 2Ø B3 C2 C9 FF FØ Ø
     1 6Ø AD Ø5 85 C9 8Ø FØ Ø5 C
     9 ØØ FØ Ø6 6Ø          :REM*128
164 DATA A2 Ø6 B8 5Ø 2Ø AD 11 Ø
     8 C9 FF FØ Ø5 C9 ØØ FØ ØB 6
     Ø A9 ØØ 8D 11          :REM*41
165 DATA Ø8 A2 ØØ B8 5Ø ØA A9 F
     F 8D 11 Ø8 A2 ØA B8 5Ø ØØ 2
     Ø 5C C2 8E 27          :REM*18
166 DATA DØ 2Ø 5F C2 6Ø 75 Ø8 Ø
     2 ØØ ØØ ØØ AD Ø5 85 C9 ØØ F
     Ø Ø1 6Ø A9 21          :REM*126
167 DATA 85 Ø6 A9 9F 85 Ø7 A9 Ø
     Ø 85 Ø9 A9 59 85 Ø8 A9 ØØ 8
     5 ØB A9 89 85          :REM*155
168 DATA ØA 2Ø B3 C2 C9 FF FØ 2
     F A9 ØØ 85 Ø9 A9 8A 85 Ø8 A
     9 ØØ 85 ØB A9          :REM*141
169 DATA B9 85 ØA 2Ø B3 C2 C9 F
     F FØ 2A A9 ØØ 85 Ø9 A9 BA 8
     5 Ø8 A9 ØØ 85          :REM*25
17Ø DATA ØB A9 E9 85 ØA 2Ø B3 C
     2 C9 FF FØ 25 6Ø A9 Ø1 8D 2
     E Ø7 A9 ØØ 8D          :REM*168
171 DATA 74 Ø8 A9 59 8D 73 Ø8 4
     C Ø1 Ø9 A9 Ø2 8D 2E Ø7 A9 Ø
     Ø 8D 74 Ø8 A9          :REM*66
172 DATA 89 8D 73 Ø8 4C Ø1 Ø9 A
     9 Ø3 8D 2E Ø7 A9 ØØ 8D 74 Ø
     8 A9 B9 8D 73          :REM*176
173 DATA Ø8 4C Ø1 Ø9 A9 ØØ 8D 2
     F Ø7 A2 21 A9 ØØ 85 Ø9 A9 5
     9 85 Ø8 A9 ØØ          :REM*214
174 DATA 85 ØB A9 E9 85 ØA 86 Ø
     6 E8 E8 E8 E8 E8 E8 86 Ø7 2
     Ø B3 C2 C9 FF          :REM*9Ø
175 DATA FØ Ø6 EE 2F Ø7 B8 5Ø E
     9 A9 Ø7 8D 3Ø Ø7 A9 21 85 Ø
     6 A9 9F 85 Ø7          :REM*65
176 DATA AD 74 Ø8 85 Ø9 AD 73 Ø
     8 85 Ø8 18 A9 Ø6 6D 73 Ø8 8
     D 73 Ø8 9Ø Ø3          :REM*18
177 DATA EE 74 Ø8 AD 74 Ø8 85 Ø
     B AD 73 Ø8 85 ØA 2Ø B3 C2 C
     9 FF FØ Ø6 CE          :REM*114
178 DATA 3Ø Ø7 B8 5Ø D1 AD 3Ø Ø
     7 C9 Ø7 FØ 1D C9 Ø6 FØ 26 C
     9 Ø5 FØ 2F C9          :REM*84
179 DATA Ø4 FØ 38 C9 Ø3 FØ 41 C
     9 Ø2 FØ 4A C9 Ø1 FØ 53 C9 Ø
     Ø FØ 5C 6Ø A9          :REM*67
18Ø DATA 8Ø 8D 13 Ø8 A9 7F 8D 1
     2 Ø8 4C F7 Ø9 A9 4Ø 8D 13 Ø
     8 A9 BF 8D 12          :REM*147
181 DATA Ø8 4C F7 Ø9 A9 2Ø 8D 1
     3 Ø8 A9 DF 8D 12 Ø8 4C F7 Ø
     9 A9 1Ø 8D 13          :REM*12
182 DATA Ø8 A9 EF 8D 12 Ø8 4C F
     7 Ø9 A9 Ø8 8D 13 Ø8 A9 F7 8
     D 12 Ø8 4C F7          :REM*27
183 DATA Ø9 A9 Ø4 8D 13 Ø8 A9 F
     B 8D 12 Ø8 4C F7 Ø9 A9 Ø2 8
     D 13 Ø8 A9 FD          :REM*15
184 DATA 8D 12 Ø8 4C F7 Ø9 A9 Ø
     1 8D 13 Ø8 A9 FE 8D 12 Ø8 4
     C F7 Ø9 2Ø 8Ø          :REM*125
185 DATA Ø7 AD 11 Ø8 C9 FF FØ 2
     5 AE 31 Ø7 BD Ø5 81 ØD 13 Ø
     8 9D Ø5 81 2Ø          :REM*51
186 DATA 32 Ø7 2Ø 8Ø Ø7 2Ø A1 Ø
     7 A9 Ø7 85 Ø8 A9 81 85 ØB A
     9 Ø5 85 ØA 2Ø          :REM*16
187 DATA C6 C1 6Ø AE 31 Ø7 BD Ø
     5 81 2D 12 Ø8 9D Ø5 81 2Ø 3
     2 Ø7 2Ø 8Ø Ø7          :REM*238
188 DATA 2Ø A1 Ø7 A9 Ø7 85 Ø8 A
     9 81 85 ØB A9 Ø5 85 ØA 2Ø C
     6 C1 6Ø ØØ ØØ          :REM*43
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TELECOMPUTING WORKSHOP

Here's a critical look at QuantumLink, the leading telecommunications network among Commodore users.

By LOREN LOVHAUG

OVER THE PAST FIVE MONTHS, I've somehow managed to avoid any real controversy with the topics in this column. However, a journalism professor once told me, "If you're not drawing any heat, you probably aren't close enough to the fire." Well, this month's column may have me hopping on hot coals. I plan to share with you my opinions on QuantumLink, which, in addition to GEnie and CompuServe, is of primary interest to C-64 and C-128 users.

In the past, I've served as a SYSOP on both GEnie and Q-Link, and I currently manage Q-Link's C-128 area and host a weekly conference on GEnie. However, as you'll soon read, my affiliations don't temper my ability to take a critical look at these networks.

QuantumLink differs from GEnie and CompuServe in that it's the only one of the three that is, in both content and access, a Commodore-exclusive network. In order to log onto Q-Link, you *must* use its proprietary software on a C-64 or a C-128 (in 64 mode). This approach is an important factor to consider when evaluating QuantumLink.

Software To Live and Die By

Of the three big networks, Q-Link's custom software is the easiest for beginners to learn, because it's completely menu-driven, colorful and very simple to use. Logging on is automatic: when you load the software, your computer and modem dial your local access number and get you onto Q-Link without the use of a password.

Q-Link's software also handles the downloading of files and buffering of text with no user interaction other than giving answers to a few obligatory prompts. A good share of Q-Link's popularity probably stems from the fact that effective use of the network doesn't require the memorization of a variety of acronyms and page numbers, or a mastery of the ins and outs of various telecommunications protocols.

However, Q-Link's ease of use is not without a price. In many respects, its software is severely limiting, especially for experienced users. Many long-time telecommunicators have very specific interests and often visit only small, specific parts of any network's download and message areas. Because of this, most networks offer various keyword shortcuts that let experienced users go directly to their desired destination, thereby avoiding the monotony of stepping sequentially through an all-too-familiar hierarchy of menus. Q-Link offers no such circumventions. In many cases, the net result is unnecessary delay and expense.

Another sore spot with Q-Link's proprietary software is in its message editors. The electronic mail editor is lousy. It's basically an old-time line editor in disguise. Automatic word-wrap is not provided, and it requires a return after every line. To make matters worse, pressing return makes the line permanent, and you can't go back to re-edit it. Finally, a return on a blank line causes the editor to terminate at once and transmit your message. I'd wager that Q-Link users have sent literally thousands of incomplete pieces of Email simply because they've accidentally hit an extra return.

Fortunately, Q-Link's public message editor is much better. It includes such modern conveniences as Insert mode and rudimentary block editing. Also, in a true online triumph, you can use the cursor keys to edit text in all four directions. Unfortunately, automatic word wrap and search and replace capabilities are still missing.

Also absent from both message editors is the ability to upload offline, prewritten text, and to forward messages and Email to specific users. To the network uninitiated, these strong criticisms of Q-Link's message editing facilities might seem unduly harsh. But the ability to effectively edit and transmit text is the lifeblood of any national telecomputing service. In this area, Q-Link is substandard.

Q-Link's software again falls short of the mark in its intolerance for Commodore and third-party peripherals. In order to access Q-Link, many user report having to unplug common peripherals like printers and interfaces.

Disk drive support on QuantumLink is poor; only the 1541 and 1571 (in Single-Sided mode) can be used. Higher capacity drives such as the SFD-1001 and the 1581 aren't supported.

There's also no facility for sending common disk commands, such as those necessary to format a new disk, scratch a file or obtain a disk directory while online. Since most modern generic terminal programs don't suffer from these problems, those related to Q-Link must be considered liabilities.

My last gripe about Q-Link's proprietary software is uttered on behalf of approximately one-third of all *RUN* readers, and, by some estimates, as many as half of all QuantumLink users—Q-Link software's lack of Native mode C-128 support. The "common denominator" approach that grants only C-64 mode access to Q-Link forces C-128 owners to do without their 80-column text display, enhanced keyboard, extra memory and faster speed.

Q-Link has expressed little interest in remedying this situation, in spite of the fact that it's one of the most consistently posted online complaints. Ironically, this means that the only telecommunications network advertised as being exclusively for Commodore eight-bit computers is also the one that excludes owners of Commodore's crowning eight-bit glory from using their machines at full capacity.

But Wait, Q-Link Is Great!

Given my critical review of QuantumLink's software, I imagine most of you are probably thinking that I really don't like the network. *Au contraire!* Q-Link outshines the ineptitude of its software because of one inescapable truth: It's people and online activity that make a network, not machines or software.

In this sense, Q-Link is 100 percent first class. Although I feel that Q-Link leaves a lot to be desired as far as its software programming is concerned, there is simply no other network that can truly claim that it has more to offer a C-64 or C-128 owner. When it comes ►

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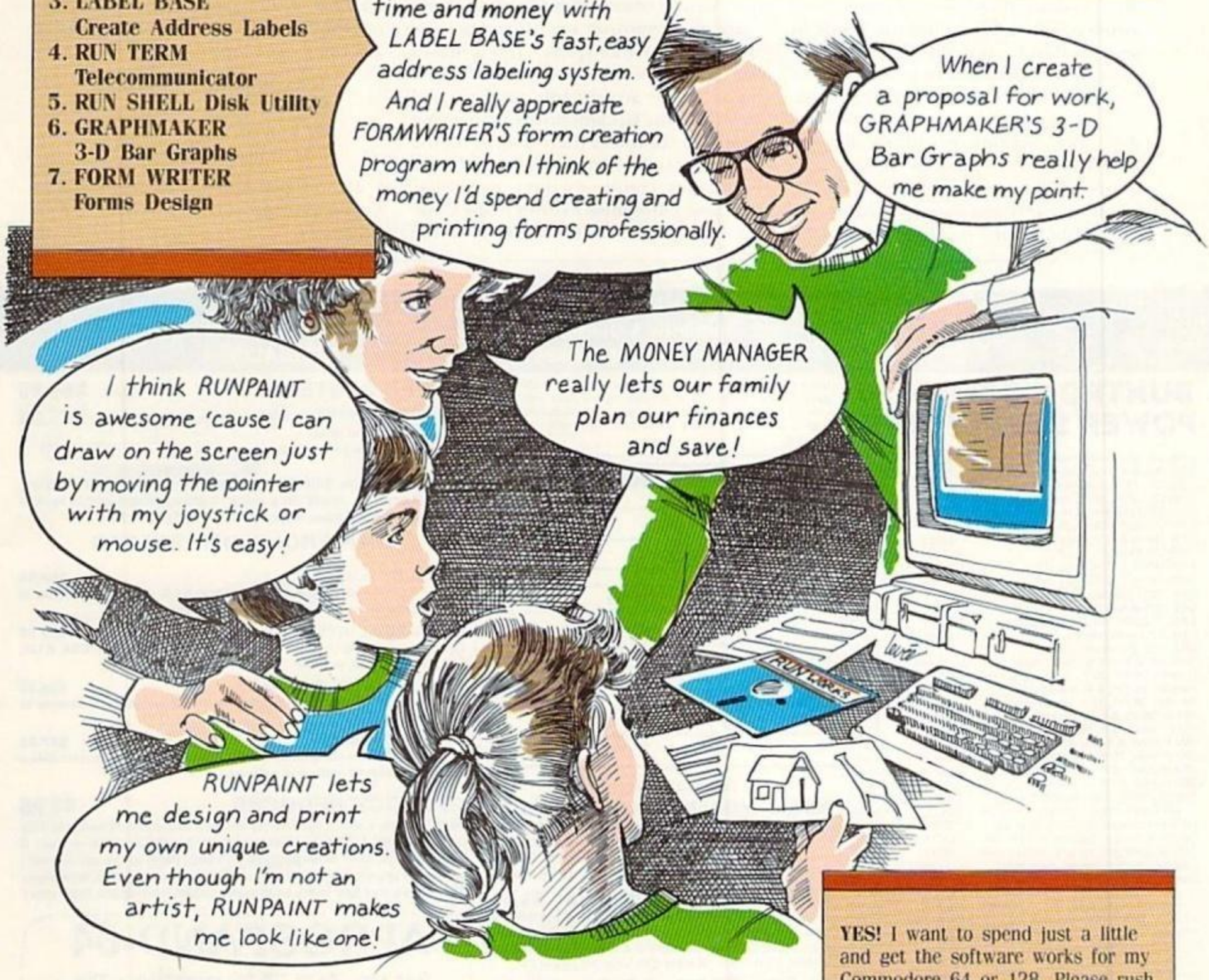
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I think RUNPAINT is awesome 'cause I can draw on the screen just by moving the pointer with my joystick or mouse. It's easy!
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to online experts, special events and interaction with other Commodore computerists, Q-Link is tops.

QuantumLink has worked harder than the other networks in marketing their system directly to Commodore owners and in providing the kinds of services that Commodore owners want most. It's no accident that nearly all of the most prolific Commodore companies, programmers and writers have their own sections on Q-Link or regularly frequent it. Because of this fact, notice of the most important C-64/128 hardware and software developments often appears first on QuantumLink, as does the cream of the crop of public domain software.

Commodore also maintains a rather large online presence. It's even claimed that "straight answers" from Commodore can be obtained on Q-Link. These "official" responses are often vague or laced with "marketspeak," but it makes for entertaining reading, and, fortunately, there are enough good-hearted folk from the Commodore engineering staff who volunteer their time to set the record straight. And to QuantumLink's everlasting credit, it's their aggressiveness and willingness to cater to the Commodore public that brings both the "official" and the "accurate" online.

Next month, I'll take a look at GEnie. ■

Loren Lovhaug is the SYSOP of QuantumLink's C-128 Special Interest Group and co-SYSOP of GEnie's Commodore Flagship. You can write to him care of:

Telecomputing Workshop
RUN Magazine
80 Elm St.
Peterborough, NH 03458

You can also send him electronic mail on QuantumLink (LOVHAUG) or GEnie (SparrowJ).

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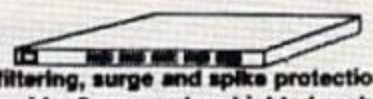

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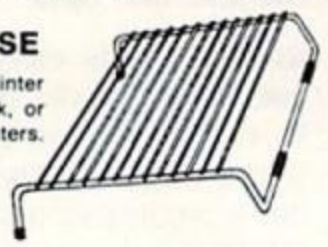

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COMMODORE CLINIC

Discover the secrets of chaining programs and copying from tape to disk; and, starting with this issue, beginning users get help.

By LOU WALLACE

Q *What's the secret to loading and running C-64 programs from within another program? I've written a program that uses a menu to load various programs, but it works only part of the time.*

—LEONARD MEEK
PEARL CITY, HI

A The "secret" to loading, or chaining, programs together on the C-64 is a technique called "dynamic keyboarding." This programmers' trick involves poking values into the keyboard buffer memory to tell the computer that you have pressed some number of keys, and also poking into the keyboard queue the keys you have pressed.

While the routine is running, it prints to the screen the phrase LOAD "filename",8; then, several lines below that, it prints the word RUN. Then it executes the Poke statements, and your computer will load and run whatever program you define in F$ in lines 1030 and 1050 below.

Use this simple program as a subroutine. Just pass the name of the program to load as the variable F$, and with the drive from which to load it defined as DN. Then GOTO this routine.

```
1000 REM C64 DYNAMIC KEYBOARD
     SUBROUTINE
1010 REM THIS WILL LOAD AND
     RUN A
1020 REM PROGRAM FROM
     DRIVE DN
1030 REM F$ = PROGRAM, DN IS THE
     DRIVE
1040 KB = 198:KQ = 631
1050 PRINT CHR$(147);"LOAD";
     CHR$(34) ;F$; + CHR$(34) +
     "," + STR$(DN)
1060 PRINT:PRINT:PRINT:PRINT:
     PRINT"RUN"
1070 POKEKQ,19:POKEKQ + 1,13:
     POKEKQ + 2,13
1080 POKE 198,3
```

Q *I recently bought a used 1700 RAM Expansion module. I'd like to use it with GEOS, but since it came sans instructions or software, I don't know how. Also, I'd like to get the RAMDOS you mentioned in the August 1988 Clinic, but I have no access to user groups or BBSs. Where can I find one?*

—BERNARD SCHULTZ
ST. PAUL, MN

A Unfortunately, GEOS doesn't support the 128K 1700 RAM expander. It works only with the 1764 (256K) or 1750 (512K). As for getting the RAMDOS, there are several user groups in your area, including the Minnesota Commodore Users Association. Their contact number is 612-533-1479.

Q *I recently typed in* RUN's *Checksum program, and when I ran it, I got a Data Error message. Here's what I typed in. Where is the problem, and how do I fix it?*

—WALTER LAPCHYNSKI, JR.
INDEPENDENCE, OH

A The problem is that you mistyped something in the listing. It's very important that you type in the listing *exactly* the way it appears. If you still have problems, proofread your listing, character for character, against the magazine listing.

For example, you transposed part of line 50 to line 30. In line 30, substitute SA + I,B:NEXT for 140,234 and press return. Also, in line 190 you typed in DATA 96,55. Retype this part of the line as DATA 96,56 and press return. Save the corrected listing before running it. Your Checksum program should work properly now.

I suggest that, when you type in listings, you use a straight edge, such as a ruler or a sheet of Post-it paper, to mark your place in the listing as you type, so that you don't inadvertently transpose or skip lines.

Q *I typed in the listing for Cards-31 ("Knock!," September 1988), and line 1440 gives me a checksum value of 42 instead of 167. I typed in the instructions in the curly brackets ({SHIFT LB.}) right, but I don't get the right value.*

—JOHN C. STRIETER
PALM CITY, FL

A Unless I see the listing as you typed it in, it's difficult to tell what's wrong. You may have typed in LB., when you should have typed in the shifted British pound sign. If you refer to "*RUN*'s Checksum" in a current issue of *RUN*, you'll see that LB. represents the British pound sign.

Please, dear readers, *always* read "*RUN*'s Checksum" if you have any problems with programs you've typed in. Also see "Type-in Troubles?" (August 1988, p. 71, November 1988, p. 91 or on page 113 of this issue) for additional type-in tips.

UPDATE

In a recent Clinic, a reader asked about finding a program that would copy files from tape to disk. Reader Larry Sunnerberg, of Salem, New Hampshire, sent in the program below in response. Even though I don't have a tape system to check its effectiveness, I am including it here in the hopes that it will help readers make the transition from tape to disk. (Remember that this program has not been tested, so make sure you have a backup of the tape before you start, just in case!)

```
10 REM TAPE TO DISK TRANSFER
20 FOR I = 53181 TO 53247:READ A:POKE
   I,A:NEXT
30 PRINT CHR$(147);"TAPE TO DISK
   TRANSFER PROGRAM"
40 PRINT:PRINT"INSERT AND REWIND
   TAPE TO BE COPIED" ►
```


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We are sure many of you have developed unique programs that you use every day. You may not realize that a whole community of users is waiting to read about and share your creations.

If you are not a programmer, don't despair. We still need you. The introduction of new Commodore products—GEOS, the 1351 mouse, the 17xx series of RAM expanders and the 1581 drive—has opened up a vast area of topics for you to write about. What commercial software packages do you use that support these devices? What are their strengths and weaknesses? Users and potential users need to know.

These are just suggestions; we're sure you can think of more. Consider this an invitation to share your knowledge and computing experiences with tens of thousands of other Commodore users. And you will be rewarded for your efforts.

To help you submit those articles and programs for publication, we provide the *RUN* author's guidelines. These information sheets give you an idea of what kinds of material we are looking for and take you step by step through the process of preparing your articles for submission.

For a free copy, send a self-addressed, stamped, business-size envelope to:

Author Guidelines
RUN Magazine
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Peterborough, NH 03458

CLINIC

```
50 PRINT:PRINT"INSERT DISK INTO
   DRIVE"
60 PRINT:PRINT"DOES THE DISK NEED
   TO BE FORMATTED? Y/N"
70 GET A$:IF A$ = "" THEN 70
80 IF A$ = "N" THEN 150
90 IF A$ <> "Y" THEN 70
100 INPUT "NAME OF DISK";A$
110 INPUT "DISK ID";B$
120 IF LEN(A$) > 16 THEN A$ =
   LEFT$(A$,16)
130 IF LEN(B$) > 2 THEN B$ = LEFT$(B$,2)
140 OPEN 15,8,15,"N0:"; + A$ + "," + B$ +
   CHR$(34):CLOSE15
150 SYS 53181
160 DATA 169,1,162,1,160,1,32,186,255,
   169,0
170 DATA 162,65,160,3,32,189,255,169,0
180 DATA 32,213,255,169,8,162,8,160,255
190 DATA 32,186,255,169,20,162,65,160,
   3,32
200 DATA 189,255,173,61,3,141,251,
   0,173,62
210 DATA 3,141,252,0,169,251,174,63,3,172
220 DATA 64,3,32,216,255,76,189,207
230 DATA 32,213,255,169,8,162,8,160,255
240 DATA 32,186,255,169,20,162,65,160,
   3,32
250 DATA 3,141,252,0,169,251,174,63,3,172
260 DATA 64,3,32,216,255,76,189,207
```

In the October 1988 Clinic, Jay Green asked how to merge two programs. You told him to check a local BBS or user's group library. I use a simple command for the C-128 that does the trick. Load the first program, then load the second with:

*BLOAD"second program", P(PEEK(4624) + 256*PEEK(4625) – 2)*

Then renumber the two programs so that the second program's line numbers are all higher than those in the first. Then enter DELETE 2 – 1 to relink the lines. Save the new program.

—BOB RENAUD
WASHINGTON, MA

We received several replies from readers about this problem, and yours was the best. Thanks BLoads, Bob. ■

Do you have a problem or question about your Commodore computer system, software or programming? Send your questions to:

Commodore Clinic
RUN Magazine
80 Elm St.
Peterborough, NH 03458.

Queries are answered only through this column, and, due to the volume of mail, only questions likely to appeal to the majority of our readers can be published.

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CRAZY CAVERNS

From p. 50.

```
179 DATA 47BØØ16ØAEA8Ø2BD4C55 F
    ØØ34CC449AD945548A9 Ø18D945
    568C9Ø2FØ5D2Ø        :REM*34
18Ø DATA 124DA9ØF8D18D4A9Ø88D Ø
    3D4A9ØØ8DØ5D4A9FØ8D Ø6D4A92
    F8DØØD4A9FF8D        :REM*243
181 DATA Ø1D42Ø634EA9ØF8D18D4 A
    9418DØ4D4A94Ø8DØ4D4 A9ØØ8D1
    8D4A9Ø18D86Ø2        :REM*22
182 DATA 18ADA75569ØA8DA755AD A
    85569ØØ8DA8552ØFC4D A21E2Ø4
    247AD9455C9Ø2        :REM*223
183 DATA DØC4EEA8Ø2ADA8Ø2C9Ø5 D
    Ø19A9ØØ8DA8Ø2AEE855 EØØ4FØØ
    4EEE855E8BDE9        :REM*2
184 DATA 558DE655EEAB5568684C Ø
    D432Ø1D4DAEA8Ø2A9ØØ 9D4C552
    ØD15Ø6ØADA8Ø2        :REM*183
185 DATA DØØEADDØ553Ø23ADØ2DØ C
    9929ØØ2186ØC9Ø1DØ16 ADDØ551
    ØØAADØ2DØC968        :REM*175
186 DATA BØØA4CE449ADØ2DØC99Ø B
    ØE4C9Ø2DØ16ADDØ551Ø ØAADØ2D
    ØC96ØBØØA4CE4        :REM*35
187 DATA 49ADØ2DØC988BØCAC9Ø4 D
    ØØFADDØ553ØØAADØ2DØ C9A69ØØ
    34CE449386Ø38        :REM*1ØØ
188 DATA ADØ2DØE9188DB65538AD Ø
    3DØE9368DB755AØØØ84 9B849CA
    DB6554A4A4A8D        :REM*217
189 DATA B655ADB7554A4A4A8DB7 5
    5AEB755FØ1Ø18A59B69 28859BA
    59C69ØØ859CCA        :REM*94
19Ø DATA DØFØ18A59B6DB655859B A
    59C69ØØ859CA9798DB9 5518A59
    B6DB955859B85        :REM*195
191 DATA A7A59C69Ø4859C18A59C 6
    9D485A86Ø2ØCØ4AA9ØØ A2Ø8AØF
    F2ØBAFFA9Ø7A2        :REM*168
192 DATA 1BAØ562ØBDFFA9ØØ859B A
    99E859CA233AØ9EA99B 2ØD8FF6
    ØA9ØØ2ØBDFFA9        :REM*5Ø
193 DATA ØAA222AØ562ØBDFFA9ØF A
    2Ø8A82ØBAFF2ØCØFFA9 ØF2ØC3F
    F6ØA9ØØA2Ø8AØ        :REM*199
194 DATA Ø12ØBAFFA21BAØ56A9Ø7 2
    ØBDFFA9ØØA2ØØAØ9E2Ø D5FF6ØA
    2ØØBD5F569DØØ        :REM*99
195 DATA 9EE8EØ32DØF56ØA9ØØ8D 1
    5DØ8DCD548D21DØA993 2ØD2FFA
    9Ø58DA8Ø22Ø26        :REM*3
196 DATA 5Ø2ØD64C2Ø9A4B2ØAE4B 2
    Ø724CEE2ØDØ2ØE4FFFØ F8C953F
    ØØEC952FØØ7C9        :REM*92
197 DATA 45DØEC4CE2FC4CED42A9 9
    32ØD2FF2Ø994A2Ø724C 4C2D4BA
    9Ø28D86Ø2A211        :REM*232
198 DATA AØØB182ØFØFFA9CEA254 2
    Ø884BA212AØØB182ØFØ FFA9E1A
    2542Ø884BA213        :REM*18
199 DATA AØØB182ØFØFFA9FØA254 2
    Ø884B6Ø85FD86FEAØØØ B1FDFØØ
    72ØD2FFC84C8E        :REM*2Ø3
2ØØ DATA 4B6ØAØ32A2ØØBDØØ9E9D Ø
    Ø9FA9ØØ9DØØ9EE888DØ F16ØA9Ø
    Ø85A9A99E85AA        :REM*193
2Ø1 DATA A9ØA8DC754A2ØØ8ECB54 1
    8ADCB5469Ø38DCB54AA 38BDØØ9
    FEDA7558DC854        :REM*196
2Ø2 DATA E8BDØØ9FEDA855ØDC854 9
    Ø23CACACACA8AA8A9Ø5 8DC654B
    DØØ9F91A9E8C8        :REM*57
2Ø3 DATA CEC654DØF48ECB54CEC7 5
    4FØØ34CCØ4B6ØADCD54 FØØ34CE
    Ø4BEECD548EC9        :REM*2Ø9
2Ø4 DATA 54A211AØØB182ØFØFFA9 F
    BA2542Ø884B382ØFØFF 8888881
    82ØFØFFAEC954        :REM*85
2Ø5 DATA CACACACA8AA88EC8542Ø C
    FFFC9ØDFØØ791A9C8CØ Ø3DØF2A
    EC854E8E8E88A        :REM*224
2Ø6 DATA A8ADA75591A9E8ADA855 C
    891A9AEC95418A5A969 Ø585A9A
    5AA69ØØ85AACE        :REM*1Ø4
2Ø7 DATA CA54FØØ34CEØ4B6ØA9Ø1 8
    D86Ø22Ø265ØA9Ø68D86 Ø2A9Ø68
    DC854A9ØC8DC9        :REM*15Ø
2Ø8 DATA 54A9ØA8DC754A9ØØ8DCA 5
    4AEC854ACC954182ØFØ FFAØØ3A
    ECA54BDØØ9E2Ø        :REM*137
2Ø9 DATA D2FFE888DØF6AØØ9A92E 2
    ØD2FF88DØFABDØØ9E8D CC54E8B
    DØØ9EE88ECA54        :REM*17
21Ø DATA AECC542ØCDBDEEC854CE C
    754DØC12Ø554B6ØA9Ø5 8D86Ø2A
    2Ø2AØØA182ØFØ        :REM*1Ø2
211 DATA FFA9ØEA2552Ø884B6Ø2Ø 1
    24DA9ØF8D18D4A9FØ8D 13D4A9B
    B8D14D4A9648D        :REM*22
212 DATA ØED4A9Ø18DØFD4A9818D 1
    2D4A98Ø8D12D46ØA218 A9ØØ9DØ
    ØD4CA1ØFA6ØA9        :REM*244
213 DATA Ø58D18D4A9ØØ8DØ5D4A9 B
    B8DØ6D4A9648DØØD4A9 F48DØ1D
    4A9218DØ4D4A9        :REM*191
214 DATA 2Ø8DØ4D46ØA9ØF8D18D4 A
    9Ø88DØ3D4A9DØ8DØ5D4 A9ØØ8DØ
    6D438ADØØD4E9        :REM*113
215 DATA ØA8DØØD4A9Ø28DØ1D4A9 4
    18DØ4D46ØA92B85B385 B5A9Ø68
    5B4A9DA85B6A9        :REM*37
216 DATA Ø88DF655A9ØØ8DF7556Ø A
    9Ø1AØAØA2Ø32ØAØ4DA9 Ø5AØAØA
    2Ø32ØAØ4DA9Ø2        :REM*32
217 DATA AØAØA2Ø22ØAØ4D4C694D 8
    DAE558CAD55AØØØADAD 5591B3A
    DAE5591B5C8AD        :REM*97
218 DATA AD5591B3ADAE5591B52Ø 7
    B46CADØE36ØA9Ø78D86 Ø2A2Ø1A
    Ø22182ØFØFFA9        :REM*154
219 DATA 95A2552Ø884BA2Ø5AØ22 1
    82ØFØFFA99BA2552Ø88 4BA2Ø9A
    Ø22182ØFØFFA9        :REM*211
22Ø DATA A1A2552Ø884BA9Ø18D86 Ø
    26ØA2Ø3AØ22182ØFØFF ADA855A
    EA7552ØCDBD6Ø        :REM*51
221 DATA A2Ø7AØ22182ØFØFFADAA 5
    5AEA9552ØCDBD6ØA2ØB AØ24182
    ØFØFFADAC55AE        :REM*64
222 DATA AB552ØCDBDA216AØ2118 2
    ØFØFFA2ØØA9F8A2552Ø 884BA9Ø
    ØAEE855E82ØCD        :REM*85
223 DATA BDA217AØ21182ØFØFFA9 F
    FA2552Ø884BA9ØØAEA8 Ø2E84CC
    DBDAEF755EØØ7        :REM*249
224 DATA FØØEAØØØBDEF5591B3C8 9
    1B3EEF7556Ø2Ø7B46A9 ØØ8DF75
    5CEF655FØØ16Ø        :REM*1[illegible]9
225 DATA A9Ø28D94556ØA2ØØBDFE 5
    19D8Ø2ØBD7E519DØØ21 E8EØ8ØD
    ØEFA9Ø18DD555        :REM*119
226 DATA A9Ø48D1DDØA9838DFAØ7 A
    9Ø78D29DØADA8Ø2ØAAA BD2E558
    DØ4DØE8BD2E55        :REM*8
227 DATA 8DØ5DØA9848DFCØ7A9Ø3 8
    D2BDØADA8Ø2ØAAABD38 558DØ8D
    ØBD42558DD655        :REM*96
228 DATA E8BD38558DØ9DØBD4255 8
    DD755A9Ø18DD55578A9 Ø98D14Ø
    3A94F8D15Ø3A9        :REM*161
229 DATA Ø88DBE55A9ØB8DBF5558 6
    ØAD9455DØØECEE455DØ Ø9ADE65
    58DE4552Ø634E        :REM*5
23Ø DATA CEBE55DØ59A9Ø88DBE55 A
    DFAØ7C982FØØ6CEFAØ7 4C364FE
    EFAØ7ADFCØ7C9        :REM*151
231 DATA 85FØØ6EEFCØ74C464FCE F
    CØ7ADD5553Ø19ADØ8DØ CDD7559
    ØØBA9FF8DD555        :REM*63
232 DATA 2Ø954F4C7A4FEEØ8DØ4C 7
    A4FADØ8DØCDD655BØØB A9Ø18DD
    5552Ø954F4C7A        :REM*62
233 DATA 4FCEØ8DØAEA8Ø2BD4C55 D
    ØØ3EE2DDØCEBF55DØØ8 A9ØB8DB
    F552ØB74F4C31        :REM*23
234 DATA EAA2842ØØØCØA2854CØØ C
    Ø8CB6558DB75538A59B EDB6558
    DB955A59CEDB7        :REM*26
235 DATA 55ØDB9556ØADA8Ø2FØ3A 2
    Ø2F4AAEA8Ø2BDBC548D BB54BDC
    154AABD5155A8        :REM*71
236 DATA E8BD5155ØØ9F4FBØØ6E8 E
    8E84CF14FE8BD5155A8 E8BD515
    5E82Ø9F4FBØØ3        :REM*23Ø
237 DATA 2ØF74FCEBB54DØD66ØAØ Ø
    ØB19BC92ØDØØ16Ø38E9 43C9Ø1D
    ØØFA92Ø919BC8        :REM*246
238 DATA 919BA9Ø18DAF554C1F5Ø A
    ABD9255919BC8919BEE Ø1DØEEØ
    3DØ6ØADA8Ø2ØA        :REM*2Ø1
239 DATA AABDC5Ø385F7E8BDC5Ø3 8
    5F8AØØØB1F7FØ4B8DDØ 55C8B1F
    78DB355C8B1F7        :REM*11
24Ø DATA 8D86Ø2C8B1F78DBØ55C8 B
    1F78DB155C8B1F78DB2 55C88CB
    455AEBØ55ACB1        :REM*1Ø7
241 DATA 55182ØFØFFADB3552ØD2 F
    FCEB255FØØBADDØ551Ø FØEEBØ5
    54C615ØACB455        :REM*23
242 DATA 4C385ØA2ØØBD7B539D8Ø 2
    1BDBB539DCØ21E8EØ4Ø DØEFADA
    8Ø2ØA48AABD2C        :REM*185
243 DATA 568DØADØE8BD2C568DØB D
    ØA9ØD8D2CDØA9868DFD Ø768AAB
    D36568DØCDØE8        :REM*2Ø7
244 DATA BD36568DØDDØA9878DFE Ø
    7A9Ø38D2DDØ6ØA9ØØ8D ØCDØA2Ø
    ØBDFB539DCØ21        :REM*113
245 DATA E8EØ4ØDØF5ADA8Ø2ØAAA B
    D4Ø568DØCDØE8BD4Ø56 8DØDDØA
    9ØA8D2DDØAD1E        :REM*23
246 DATA DØ6ØØØØØØØØØØØØØØØØ Ø
    ØØØØØØØØØØØØØØØØØØ ØØØØØØØ
    ØØØØØØØØØØØØ        :REM*125
247 DATA ØØØØØØØØØØØØØØØØØØØ Ø
    ØØØØØØØØØØØØØØØØØØ ØØØØØØØ
    ØØØØØØØØØØØØ        :REM*185
248 DATA ØFØØØØFCØBEØØØØØØØ Ø
    ØØØØØØØØØØØØØØØØØØ ØØØØØØØ
    ØØØØØØØØØØØØ        :REM*237 ►
```


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CRAZY CAVERNS

```
249 DATA ØØØØØØØØØØØØØØØØØØØØ Ø
    ØØØØØØØØØØØØØØØØØØØØ ØØØØØØØ
    ØØØØØØØØØØØØØ        :REM*191
25Ø DATA ØØØØØØØF3CØØFC3FØBE Ø
    1F8ØØØ3FCØØØ3F78ØØ3 FCØØØ3F
    CØØØ1F8ØØØØ6Ø        :REM*252
251 DATA ØØØØ6ØØØØØ6ØØØC1F8ØØ C
    354ØC43FEBØFFFEAØ43 FEAØC3F
    C1ØC3FCØCØ1F8         :REM*76
252 DATA ØØØØØØØØ2AAØØØ6Ø3ØØ Ø
    154ØØØØØØ6ØØØØØ6ØØØ Ø1F8ØØØ
    36CØØØ3FCØØØ2         :REM*156
253 DATA F4ØØØ3ØCØØØ1F8ØØØØ6Ø Ø
    ØØ1F8ØØØ2ACØØ63FDEØ FFFDØØ6
    3FDEØØ3FCØØØ3         :REM*135
254 DATA FCØØØ1F8ØØØØØØØØ2AA Ø
    ØØ4Ø1ØØØ2AAØØØØØØØ ØØØØØØØ
    ØØØØØØØØØØØØ         :REM*95
255 DATA ØØØØØØØØØØØØØØØØØØØØ Ø
    ØØØØCCCCC7FFFFF4ØØØ Ø17FFFF
    F7FFFFFØØØØØØ         :REM*112
256 DATA ØØØØØØØØØØØØØØØØØØØØ Ø
    ØØØØØØØØØØØØØØØØØØØØ ØØØØØØØ
    ØØØØØØØØØØØØ         :REM*128
257 DATA ØØØØØØØØØØØØØØØØØØØØ Ø
    ØØØØØØØØØØ3333337F FFFF4ØØ
    ØØ17FFFFF7FFF         :REM*171
258 DATA FFØØØØØØØØØØØØØØØØØØ Ø
    ØØØØØØØØØØØØØØØØØØØØ ØØØØØØØ
    ØØØØØ4Ø554114         :REM*218
259 DATA 551455ØØØØ4155555545 4
    1ØØØØØØ425555111155 55ØØØØ4
    3FFAAFEFEAABF         :REM*14
26Ø DATA BFAA44ØØØØFFAAFEFEAA B
    F46ØØØØØØØØFFAAFEFE 45ØØØØØ
    ØØØØØØØFFAA47         :REM*65
261 DATA 55Ø44Ø15Ø44151454C44 C
    Ø4C41CØA5FB48A5FC48 2Ø91CØ2
    Ø36CØAØØØA23C         :REM*8
262 DATA 2Ø2ECØ2Ø2ECØ2Ø2ECØCA C
    ACACACACA1ØEF6885FC 6885FB6
    ØBDB4CØ91FBC8         :REM*14Ø
263 DATA E86ØAØ3FB1FB99B4CØ88 1
    ØF86Ø38BØØ118A9ØØ69 ØØ8DB2C
    ØA5FB48A5FC48         :REM*29
264 DATA 2Ø91CØ2Ø36CØAØØØB9B4 C
    Ø48B9B6CØ99B4CØ6899 B6CØC8C
    8C8CØ42DØEBAØ         :REM*4
265 DATA 3FB9B4CØAEB2CØDØ27A2 Ø
    74A2EB3CØCA1ØF9ADB3 CØ91FB8
    81ØE76885FC68         :REM*79
266 DATA 85FB6ØA9ØØ85FB86FC46 F
    C66FB46FC66FB6ØA2Ø7 4AØ84A2
    EB3CØ282EB3CØ         :REM*217
267 DATA CACA1ØF23ØDØØØØØØØØØ Ø
    8ØØØØ44ØØØ6828ØØ149 ØØØ1322
    Ø121C4ØØCØC24         :REM*16Ø
268 DATA Ø38618ØØ722ØØØ132ØØØ 3
    34ØØ1578ØØØDFØØØØ7C ØØØØ1EØ
    ØØØ1EØØØØ1EØØ        :REM*14Ø
269 DATA ØØ1FØØØØ7B8ØØ1F7CØØØ Ø
    ØØØØØØØØØØØØØØØØØØ ØØØØØØØ
    ØØØØØØØØØØØØ         :REM*99
27Ø DATA ØØØ3C3CØØ342CØØ1E7ØØ Ø
    Ø7EØØØFE7FØØFE7FØØF E7FØØFE
    7FØØØØØØØØFE7         :REM*245
271 DATA FØØFE7FØØFE7FØØFE7FØ Ø
    ØØØØØØØØØØ3ØØØØØØØ ØØØØØØØ
    ØØØØØØØØØØØØ         :REM*149
272 DATA ØØØØØØØØØØØØØØØØØØØØ Ø
    ØØØØØØØ2ØØØ181ØØØ18 28ØØ387
    FFFFC4924DCFF         :REM*4Ø
273 DATA FFFC7FFFFC3FFFFC1FFF F
    846ØØ6166ØØ633FFFFE ØØØ28ØØ
    ØØAAAØØØ4AAØØ        :REM*2Ø2
274 DATA Ø455ØØØØ5ØØØØØ15ØØØØ 1
    5ØØØØ28ØØØØ2AØØØØA2 8ØØØ8A8
    ØØØ8A8ØØØA58Ø         :REM*149
275 DATA ØØØ5ØØØØAA8ØØØAA8ØØØ 2
    AØØØØØAØØØØØAØØØØØØ ØØØØØØØ
    ØBE1A8ØØØ1AAA         :REM*85
276 DATA ØØØØAAØØØØ55ØØØØ5ØØØ Ø
    Ø15ØØØØ15ØØØØ28ØØØØ AAØØØØA
    28ØØ2A28ØØ2A8         :REM*199
277 DATA 94Ø4AA94Ø5ØØØ4ØØAA8Ø Ø
    ØAA8ØØØ2AØØØØ8A8ØØ2 A28ØØØØ
    ØØØØØØØØØBEØØ         :REM*88
278 DATA ØØØ2Ø4Ø4Ø6ØØØØØ81828 Ø
    ØØØØØØØØØØØØØØØ2853 2941564
    52Ø484947482Ø         :REM*122
279 DATA 53434F524553ØØ285229 4
    553544152542Ø47414D 45ØØ284
    5294E442Ø4741         :REM*13
28Ø DATA 4D45ØØ454E5445522Ø49 4
    E49544941 4C533AA4A4 A4ØØ534
    14E5441275320         :REM*169
281 DATA 48414C4C2Ø4F462Ø4641 4
    D45ØØØ7ØBØF13151C1F ØD11ØC1
    96E8770876453         :REM*174
282 DATA 6F9B85AA3A7C844EE17F 3
    48F469F3A5D84E7E1FA 3453466
    EØ1Ø1Ø1Ø1Ø12A         :REM*193
283 DATA Ø737Ø7FDØ4ØDØ591Ø699 Ø
    6B9Ø6C1Ø6E1Ø6E9Ø6Ø9 Ø711Ø7E
    1Ø4E7Ø4A8Ø5AF         :REM*69
284 DATA Ø532Ø638Ø641Ø649Ø6CF Ø
    4E5Ø46AØ585Ø582Ø68B Ø699Ø69
    BØ699Ø69CØ678         :REM*149
285 DATA Ø786Ø7ØØ44ØØØØ53434F 5
    245ØØ4849205Ø54ØØ53 414E544
    1ØØØØØØØØØØ3          :REM*53
286 DATA ØØØØØØØØØØØØØØØØØØØØ Ø
    ØØØØØØØØØØØØØØØØØØØØ ØØØØØØØ
    ØØØØØØØØØØØØ         :REM*1Ø1
287 DATA ØØ8B8CØØ81ØØØØØØØØØØ Ø
    ØØØØØØØØØØØ6ØØØØØ8 ØØØØ8B8
    CØØ81ØØØØØØØ         :REM*89
288 DATA ØØ644B32231914E3F7F8 6
    2796F2ØØ8ØØ4C455645 4C3AØØ5
    343524E3AØØ47         :REM*95
289 DATA 414D452Ø4F5645522ØØ C
    6C6A24B3C5Ø41555345 ØØ2E534
    34F524553533Ø         :REM*161
29Ø DATA 3A2E53434F5245536E57 B
    CDFBØB46BD46BD22469 FC2FC83
    48CD227DØ28DA         :REM*72
291 DATA F9DAC8DF254CF947ØØØØ Ø
    ØØØØØØØØØØØØØØØØØØ ØØØØØØØ
    ØØØØØØØØØØ4A         :REM*14Ø
292 DATA 565278144A565258114A 5
    65228ØF4A5652540B4A 56524CØ
    94A5652EAØ64A         :REM*193
293 DATA 565278Ø54A5652E8Ø34A 5
    6529EØ24A5652CCØ1Ø5 4ØA54Ø2
    Ø41AE41124282         :REM*233
294 DATA 42ØØØØØØØØØØØØØØØØØØ Ø
    ØØØØØØØØØØØØØØØØØØ ØØØØØØØ
    ØØØØØØØØØØØØ         :REM*115
295 DATA ØØØØØØØØØØØØØØØØØØØØ Ø
    ØØØØØØØØØØØØØØØØØØ ØØØØØØØ
    ØØØØØØØØØØFØ         :REM*91
296 DATA ØØ3FØØØBEØØØØØØØØØ Ø
    ØØØØØØØØØØØØØØØØØØ ØØØØØØØ
    ØØØØØØØØØØØØ         :REM*95
297 DATA ØØØØØØØØØØØØØØØØØØØØ Ø
    ØØØØØØØØØØØØØØØØØØ ØØØØØØØ
    ØØØØØØØØØØØØ         :REM*1Ø4
298 DATA ØØØØØ3CØFØØFC3FØBEØØ Ø
    28ØØØØAAØØØAA1ØØØ55 1ØØØØ5Ø
    ØØØ54ØØØ54ØØ         :REM*6Ø
299 DATA ØØ28ØØØØA8ØØØ28AØØØ2 A
    2ØØØ2A2ØØØ25AØØØØ5Ø ØØØ2AAØ
    ØØ2AAØØØØAØØØ        :REM*96
3ØØ DATA ØØAØØØØAØØØØØØØØØØ Ø
    ØØØBEØØØ2A4ØØAAA4ØØ A8ØØØØ5
    5ØØØØ5ØØØ54          :REM*98
3Ø1 DATA ØØØØ54ØØØØ28ØØØØAAØØ Ø
    28AØØØ28A8Ø162A8Ø16 AA1ØØØØ
    Ø5ØØ2AAØØØ2AA         :REM*117
3Ø2 DATA ØØØØA8ØØØ2A2ØØØ28A8Ø Ø
    ØØØØØØØØØØBEØØØØØ ØØØØØØØ
    ØØØØØØØØØØØØ         :REM*238
3Ø3 DATA ØØØØØØ           :REM*196
3Ø4 DATA -1               :REM*162
```

Listing 2. High-score file generator.

```
1Ø REM --> RUN THIS SCORE FILE
   GENERATOR              :REM*148
2Ø REM --> JUST ONCE ON SAME DI
   SK AS                  :REM*219
3Ø REM --> GAME PROGRAM.
                          :REM*175
4Ø I=32768                :REM*18
5Ø READ A:IF A=256 THEN 7Ø
                          :REM*14Ø
6Ø POKE I,A:I=I+1:GOTO 5Ø
                          :REM*41
7Ø SYS 57812".SCORES",8,1
                          :REM*127
8Ø POKE 193,Ø:POKE 194,128
                          :REM*2Ø9
9Ø POKE 174,5Ø:POKE 175,128
                          :REM*115
1ØØ SYS 62957             :REM*62
11Ø PRINT "SAVE COMPLETE. CHECK
     DRIVE FOR ERRORS"    :REM*134
12Ø DATA 74,86,82,124,21,74,86,
   82                     :REM*36
13Ø DATA 2Ø,2Ø,74,86,82,16,19,7
   4                      :REM*171
14Ø DATA 86,82,6Ø,15,74,86,82,2
   Ø                      :REM*49
15Ø DATA 1Ø,74,86,82,2Ø8,7,74,8
   6                      :REM*34
16Ø DATA 82,148,7,74,86,82,14,6
                          :REM*228
17Ø DATA 74,86,82,158,2,74,86,8
   2                      :REM*43
18Ø DATA 48,2,256         :REM*236 ■
```


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TYPE-IN TROUBLES?

Troubleshooting tips for entering listings.

YOU HAVE TYPED IN A *RUN* PROGRAM and are having some problems getting it to run. After a while, you feel like calling for help, but since we're not next door, it's expensive to call us. But we can share our experiences with you. Having heard from many users over the years about their difficulties with typing in listings, we've identified a few recurring problems that plague many people but are easy to fix. So read on and see if your problem is one of these. If so, perhaps the answers will help you find and correct the difficulty.

- You get an Out of Data in Line xxx message. This means that a program line was reading from Data statements and reached the end of the data before it was done reading. There are two possible problems.

One might be with the line that reads the data, usually a For . . . Next loop. Make sure you have the proper values for the loop, because if the listing has a loop of 0 to 150 and you've typed 0 to 160, you'll get the "Out of Data" message. If the loop is correct, then the problem lies in the Data statements themselves. One possibility is that you omitted a whole line of data. That's easy enough to find and correct. More likely, you may have skipped one or more individual data items or typed in a period instead of a comma, which causes two data values to be read as one number. Check your typing carefully against the listing.

- You get an Illegal Quantity Error in Line xxx. That means that you've read a number from a Data statement and tried to Poke it into a memory address. The error occurs because the number is larger than 255 (the largest value a memory address can contain), which means that somewhere in your Data statements you've made an error by typing in a number larger than 255. Again, this is easy to check for and correct. Just look in your Data statements for a number larger than 255. You might have added an extra digit, or perhaps you ran two numbers together (23456 instead of 234,56).
- You get a Syntax Error in Line xxx. This could be almost anything. What it tells you is that there is something wrong in the indicated line. Usually you've misspelled a Basic keyword or omitted some required character. List the line and examine it carefully.
- You get an Error in Data message. This occurs in programs that add up all the data as read, and, when finished, compares that sum with what it should be if all the data were typed in correctly. If it isn't the same, it means an error somewhere in typing the Data statements. Go back and check the data carefully, correct the mistake(s), save the new version and try again.

Finally, we urge everyone who intends to type in one of our listings to use *RUN*'s Checksum program, which is printed in each issue. This nifty little program will help you avoid every mistake we mentioned above, except that it won't detect the omission of a line. ■

—LOU WALLACE

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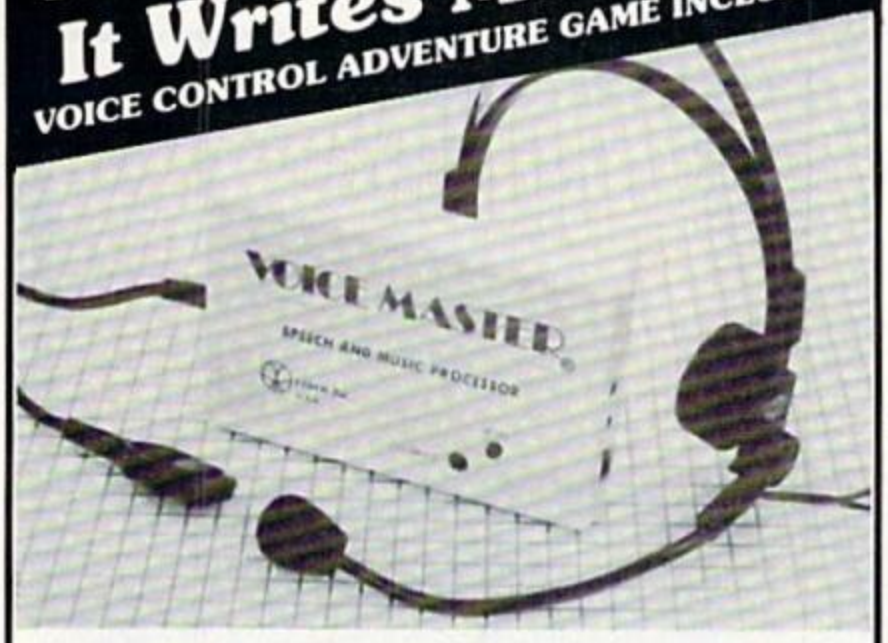

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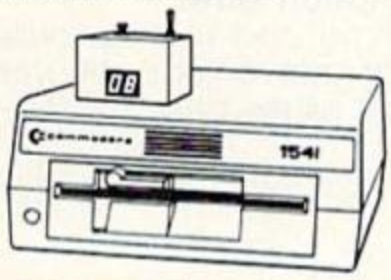

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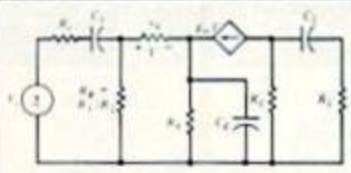

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RUN's Checksum

TYPE IN *RUN*'s CHECKSUM, which serves for both the C-64 and for the C-128 in either 40- or 80-Column mode, and save it to disk before running. When typing in a program from *RUN*, first load and run *RUN*'s Checksum. The screen will display a SYS number that deactivates and reactivates the Checksum. Always disable *RUN*'s Checksum before attempting to run another program. Note: You can abbreviate Basic keywords; spaces affect the checksum only when within quotes; and the order of characters affects the checksum.

With this new version, when you press return after typing in a program line, a one-, two-, or three-digit number from 0 to 255 appears in the home position. If this number matches the checksum value in the program listing, the line is correct. If the number that appears *doesn't* match the checksum value, compare the line with the magazine listing to find your error. Then move the cursor back up to the line and make your corrections. Now, after you press return, the correct checksum value should appear. Continue entering the listing until all the lines have been correctly typed. Then deactivate *RUN*'s Checksum, using the SYS number. Save the finished program.

All the graphics and control characters in the listings in *RUN* have been translated into understandable key combinations. They are the instructions you see inside the curly braces. For example, {SHIFT L} means you hold down the shift key while you press the L key. You do *not* type in the curly braces. What appears on the screen will look quite different from what is designated inside the braces. Here are some more examples:

{22 SPACEs}—press the space bar 22 times
{SHIFT CLR}—hold down the shift key and press the clr-home key
{2 CRSR DNs}—press the cursor-down key twice
{CTRL 1}—hold down the control key and press the 1 key
{COMD T}—hold down the Commodore logo key and press the T key
{FUNCT 1}—press the F1 key
{5 LB.s}—press the British pound key (*not* #) five times R

Listing 1. *RUN*'s Checksum program. This program is available on *RUN*'s BBS for users to download.

```
10 REM RUN'S CHECKSUM 64/128 - BOB KODADEK
20 MO=128:SA=3328:IF PEEK(40960)THEN MO=64:SA=4
   9152
30 FOR I=0TO169:READB:CK=CK+B:POKE SA+I,B:NEXT
40 IFCK<>20651 THENPRINT"DATA ERROR!":END
50 POKESA+110,240:POKESA+111,38:POKESA+140,234
60 PRINTCHR$(147)STR$(MO)" RUN CHECKSUM":PRINT
70 PRINT"TO TOGGLE ON OR OFF, SYS"SA:IF MO=128
   THEN 100
80 POKESA+13,124:POKESA+15,165:POKESA+25,124:PO
   KESA+26,165
90 POKESA+39,20:POKESA+41,21:POKESA+123,205:POK
   ESA+124,189
100 POKESA+4,INT(SA/256):SYS SA:NEW
110 DATA 120,162,24,160,13,173,4,3,201,24,208,4
    ,162,13,160,67,142,4,3,140
120 DATA 5,3,88,96,32,13,67,152,72,169,0,141,0,
    255,133,176,133,180,166,22
130 DATA 164,23,134,167,132,168,170,189,0,2,240
    ,58,201,48,144,7,201,58,176
140 DATA 3,232,208,240,189,0,2,240,42,201,32,20
    8,4,164,180,240,31,201,34
150 DATA 208,6,165,180,73,1,133,180,230,176,164
    ,176,165,167,24,125,0,2,133
160 DATA 167,165,168,105,0,133,168,136,208,239,
    232,208,209,169,42,32,210
170 DATA 255,165,167,69,168,170,169,0,32,50,142
    ,169,32,32,210,255,32,210
180 DATA 255,169,13,32,210,255,104,168,96,104,1
    70,24,32,240,255,104,168
190 DATA 96,56,32,240,255,138,72,152,72,24,162,
    0,160,0,32,240,255,169
200 DATA 42,208,198
```


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JANUARY

COMING ATTRACTIONS

30 FUN FACTS—

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TUTORIALS—

The January issue is your opportunity to learn how to program two of Commodore's newest peripherals—the 1351 mouse and the RAM expander.

TYPE-INS—

Among the program listings we'll be presenting next month are 64 Calendar Maker, Address Book 128 and Multitasking 64.

RERUN PREVIEW—

Here's the lineup for the November–December ReRUN disk: **Mystery Match (64)**—Sharpen your memory skills and concentration; **Hail to the Chief (64)**—Presidential trivia game; **Panel Maker (64)**—Create on-screen panels; **Crazy Caverns (64)**—Help Santa Claus find missing presents; **Math Match (64)**—Learn arithmetic the fun way; **Instant Address Book (128)**—Store addresses and phone numbers; **Icon Editer (64)**—Make icons for GEOS; **Finance 128 (128)**—Maintain loan balances and payments.

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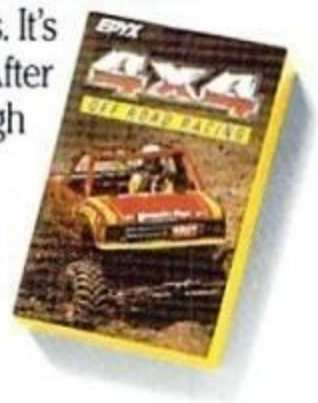

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